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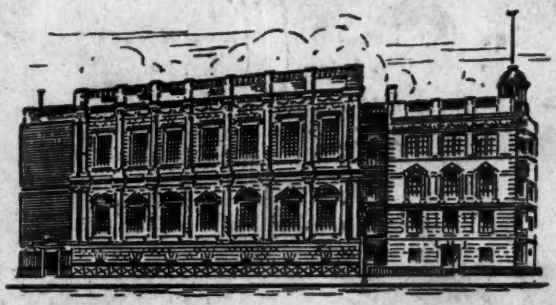

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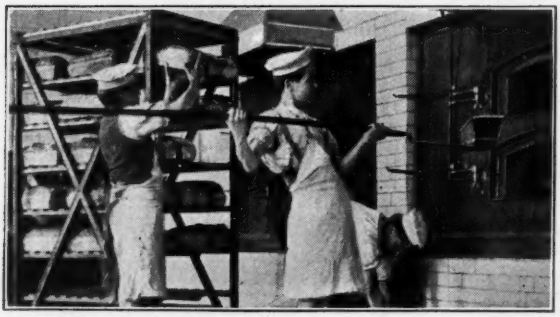

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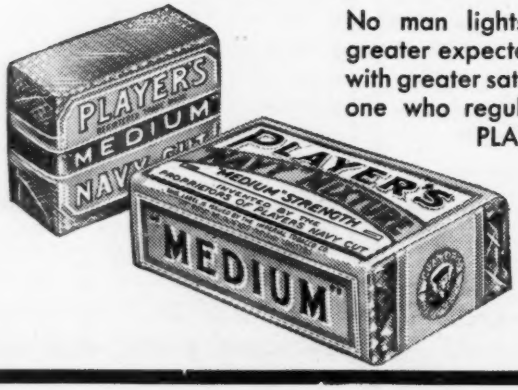

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MEMBERSHIP

Full particulars of Membership with alternative forms for Bankers' Orders can be obtained on application to " The Secretary, Royal United Service Institution, Whitehall, London, S.W.1."

Commissioned Officers of *all* H.M. fighting Services, including those of the Dominions, Colonies and India, and Midshipmen of the Royal Navy, Royal Naval Reserve and Royal Naval Volunteer Reserve, are eligible for membership without proposal or ballot.

Naval, Military and Air Force Cadets are eligible on the recommendation of their Commanding Officers.

An Officers' Mess may subscribe to the JOURNAL, but is *not* eligible for membership.

TERMS OF SUBSCRIPTION.

ANNUAL MEMBERS.—Entrance £2 2s. 0d.; annual subscription, payable on 1st January each year, £1 5s. 0d.

Annual Members joining on and after 1st October are not called upon for any subscription for the following year.

LIFE MEMBERS.

(*a*) £20 0s. 0d., payable in one sum or :

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It is important that Officers joining should furnish full and clear particulars of their Name, Rank, Ship, Regiment or R.A.F. Squadron, etc., and the address to which they wish their JOURNALS sent.

Officers of the Indian, Dominion and Colonial Naval, Military and Air Forces temporarily in the United Kingdom may become members for a period of six months on payment of Ten Shillings and Sixpence, or One Guinea for twelve months.

SPECIAL FACILITIES FOR JUNIOR OFFICERS.—Officers of less than three years seniority in commissioned rank, Midshipmen R.N., R.N.R., R.N.V.R,, and Naval, Military and Air Force Cadets are not required to pay the Entrance Fee, but their membership will date from 1st January.

THE INSTITUTION.

The Royal United Service Institution is situated just below the War Office in Whitehall. It has the best professional Library in the United Kingdom; a Lecture Theatre where an autumn and winter session of lectures is devoted to subjects of current or historical Service interest. The Reading and Smoking Rooms are provided with the leading papers, periodicals and writing materials.

The Institution is open daily from 10 a.m. to 7 p.m., except Sunday, Christmas Day and Good Friday.

THE JOURNAL.

The R.U.S.I. JOURNAL is published quarterly and sent post free to Members in any part of the world.

THE MUSEUM.

Situated in the Banqueting Hall of the old Palace of Whitehall (1622), with its magnificent Rubens ceiling, the R.U.S.I. Museum is a treasure house of relics and mementoes of great victories and renowned warriors. There is also a most valuable collection of Uniforms, Medals, Ship Models, and models of the battles of Trafalgar and Waterloo.

For Members and their friends, there are private entrances to the Museum from the Institution.

H.M. Forces in uniform are admitted free at the public entrance.

Admission to the general public is 1s.; Saturday after Noon, 6d.

SECRETARY'S NOTES

May, 1931.

Royal Visits.

The King and Queen honoured the Institution with a visit on 31st March. Their Majesties were received by Field-Marshal Sir Claud Jacob, G.C.B., G.C.S.I., K.C.M.G., Chairman of the Council, and Captain E. Altham, C.B., R.N., Secretary and Chief Executive Officer. Colonel E. L. Hughes, D.S.O., O.B.E., Librarian and Curator, and Captain S. J. Parker, M.C., D.C.M., were presented by the Chairman. Their Majesties spent an hour inspecting the Museum, including the special Centenary exhibits in the Crypt and the recent improvements to the Banqueting Hall.

King Alfonso and the Infante Juan visited the Museum on 25th April.

Centenary.

Evening Reception.

A leaflet is enclosed in this JOURNAL giving details of the Evening Reception to be held in the Institution to celebrate the Centenary of its Foundation, on Thursday, 2nd July. Members are requested to make this as widely known as possible. Early application for tickets should be made to the Secretary.

Centenary Fund.

This Fund has been opened with a view to securing some object or objects of lasting benefit to the Institution or Museum. The Centenary Committee have recommended as the first purpose of the Fund the acquisition of a portrait of His Majesty the King. Donations, however small, will be most welcome. Cheques should be made payable to the Royal United Service Institution, and crossed "A/c of Centenary Fund." The Committee beg to acknowledge receipt of donations to the Centenary Fund from the following Members since the publication of the February JOURNAL: Major A. L. K. Anderson, Messrs. T. A. Reed & Co., Lieutenant-Colonel W. Clemson, Lieutenant-General Sir H. E. Belfield, Admiral Sir W. de Salis, Captain E. E. D. Hedley, Lieutenant-Colonel A. K. Rawlins, Lieutenant-Commander W. M. Knowles, R.N., Colonel C. H. Colvin, Major G. D. Baillie-Hamilton, Admiral Sir W. H. Henderson, Colonel J. Josselyn, Commodore H. Stockwell, R.N.R., Brigadier H. R. Sandilands, H. K. Heyland, Esq., Major A. W. H. Lees, Captain W. L. Jackson, R.N., Major F. L. V. Swaine, Captain S. H. Brooks, Lieutenant-Commander C. E. M. Law, R.N., Colonel R. J. Armes,

Council.

At the Annual General Meeting the following were unanimously elected to fill the vacancies on the Council :—

ROYAL NAVY.

Rear-Admiral The Hon. R. A. R. Plunkett-Ernle-Erle-Drax, C.B., D.S.O.

ARMY.

Major-General J. R. E. Charles, C.B., C.M.G., D.S.O.

Chairman of the Council.

Field-Marshal Sir Claud W. Jacob, G.C.B., G.C.S.I., K.C.M.G., has been re-elected Chairman of the Council for the year 1931–1932.

Admiral of the Fleet Sir Roger J. B. Keyes, Bt., G.C.B., K.C.V.O., C.M.G., D.S.O., LL.D., D.C.L., has been re-elected Vice-Chairman of the Council for the year 1931–1932.

Ex-Officio Members.

Air-Commodore F. W. Bowhill, C.M.G., D.S.O., has succeeded Air Vice-Marshal C. L. N. Newall, C.B., C.M.G., C.B.E., A.M., as Air Ministry Representative on the Council.

Council Committees.

The Finance, Journal and Library, and Museum and General Purposes Committees have been re-elected for the year 1931–1932.

Major-General J. C. Dill, C.B., C.M.G., D.S.O., has replaced Major-General C. W. Gwynn, C.B., C.M.G., D.S.O., on the Journal and Library Committee.

New Members.

The following Officers joined the Institution during the months of February, March and April :—

ROYAL NAVY.

Admiral Sir Reginald Y. Tyrwhitt, Bt., G.C.B., D.S.O., D.C.L.
Acting Sub-Lieutenant C. E. L. Sclater, R.N.
Midshipman R. P. G. Wilson, R.N.
Commander G. R. B. Back, R.N.
Sub-Lieutenant R. B. N. Hicks, R.N.
Commander C. M. Stack, R.N. (retired).
Midshipman N. A. Blount, R.N.R.
Midshipman P. E. Muers, R.N.
Lieutenant-Commander J. A. Binnie, R.N.
Lieutenant G. G. Pugh Cook, R.N.
Lieutenant W. F. H. C. Rutherford, R.N.

ARMY.

Lieutenant D. C. Campbell-Miles, South Wales Borderers.
Captain E. Ainger, 3rd The King's Own Hussars.
Major H. Price-Williams, D.S.O., M.C., R.A.
Lieutenant-Colonel A. H. Webb, C.M.G., D.S.O., R.A. (retired).
Captain F. B. Webb, Gurkha Rifles.
2nd Lieutenant W. S. F. Hickie, K.O.Y.L.I.
2nd Lieutenant C. R. Tuff, The Buffs.
2nd Lieutenant R. H. Barry, Somerset Light Infantry.
2nd Lieutenant E. A. Calderbank, King's Own Royal Regiment.
2nd Lieutenant F. F. Laugher, The Dorset Regiment.
Lieutenant G. D. Baker, The Worcester Regiment.
2nd Lieutenant A. J. D. Turner, The Suffolk Regiment.
Captain W. P. Barclay, The Black Watch.
2nd Lieutenant M. Moore, The Scots Guards.
Lieutenant A. C. H. Newnham, Royal Tank Corps.
Lieutenant R. R. Phillips, Gloucestershire Regiment.
Captain G. C. Shaw, R.A.O.C.
Major W. J. W. Kerr, Somerset Light Infantry (retired).
Lieutenant J. K. Mathew, Irish Guards.
Lieutenant C. Dalby, King's Royal Rifle Corps.
2nd Lieutenant J. Maitland-Addison, Grenadier Guards.
Captain R. C. Cooney, O.B.E., Royal Tank Corps.
2nd Lieutenant J. L. Chapman, Royal Sussex Regiment.
2nd Lieutenant J. H. H. Whitty, Royal West Kent Regiment.
Captain J. B. Church, Royal Engineers.
Major A. P. H. Cadell, Bombay Grenadiers.
Lieutenant P. G. Boon, The Dorset Regiment.
2nd Lieutenant G. R. Stevens, Royal Fusiliers.
Lieutenant D. J. B. Houchin, Northamptonshire Regiment.
2nd Lieutenant K. Stewart Johnston, K.O.S.B.
2nd Lieutenant S. G. Dickson, The Royal Scots.
Lieutenant V. C. Sclater, The Dorset Regiment.
2nd Lieutenant H. H. Sykes, 9th Lancers.
Lieutenant A. R. Logan, R.E.
2nd Lieutenant P. H. D. Dessain, The Green Howards.
Lieutenant J. Hooper, R.A.
2nd Lieutenant N. G. Macdonald, The King's Regiment.
2nd Lieutenant D. A. Affleck-Graves, The Dorset Regiment.
2nd Lieutenant C. E. Jarvis, T.A.
Lieutenant J. K. L. Roberts, The Sherwood Foresters.
Lieutenant L. J. G. Showers, K.G.O. Gurkha Rifles.
2nd Lieutenant J. G. C. Waldron, Gloucestershire Regiment.
2nd Lieutenant W. C. Burn, Royal Tank Corps.
Lieutenant A. J. B. Tarrant, K.S.L.I.
2nd Lieutenant J. G. McKendrick, R.E.
2nd Lieutenant H. E. Wood, Royal Corps of Signals.
Lieutenant C. A. de B. Brounlie, Royal West Kent Regiment.
Captain J. R. Morris, Gurkha Rifles.
Captain G. L. Roberts, Bombay Grenadiers.
2nd Lieutenant R. H. Farrant, R.A.

Lieutenant E. G. Hazelton, Essex Regiment.
Lieutenant R. C. E. Herbert, Grenadier Guards.
Captain J. A. Inglis-Jones, Grenadier Guards.
2nd Lieutenant C. M. F. Deakinm, Grenadier Guards.
2nd Lieutenant P. T. Clifton, Grenadier Guards.

ROYAL AIR FORCE.

Flight-Lieutenant E. D. H. Davies, R.A.F.
Flight-Lieutenant F. F. Inglis, R.A.F.
Flying Officer R. Harston, R.A.F.
Flight-Lieutenant C. B. R. Pelly, R.A.F.
Flight-Lieutenant E. C. de V. Last, R.A.F.
Flight-Lieutenant P. L. Plant, R.A.F.

Gold Medal Essay, 1931.

The following Essay has been received :—

" A security for such as pass on the seas upon their lawful occasions."

JOURNAL

Centenary Number and Booklet.

The first half of the current number of this JOURNAL contains a number of articles and pictures associated with the Centenary of the Institution and the history of the Navy, Army and Service aviation during the past hundred years. These are being republished in booklet form in a specially designed cover under the title " A Hundred Years of the Fighting Services."

Copies of this booklet will be available at 1s. each, or 1s. 3d. post free.

MUSEUM

Special Exhibition

By the date of the Centenary it is anticipated that the following Special Exhibitions will be showing :—

NAVAL : Models representing progress in warship construction in the past hundred years.

ARMY : Dioramas representing the most famous battles during the past hundred years, and the Army of to-day.
Also scale models of guns, tanks, armoured cars and a modern military bridge.

AIR : A panorama of aeroplane models showing the development of Service aviation from earliest days, with special sections devoted to :—The Royal Naval Air Service and Fleet Air Arm ; The Royal Flying Corps and Army Co-operation Squadrons ; Coastal Reconnaissance Squadrons ; and other Royal Air Force types of to-day.

Additions.

(8370) Silhouette Portrait of Major-General Wolfe.—Presented by H. H. Harrod, Esq.

(8371) Disguise worn by T. H. Kavanagh, V.C., when he passed through the Mutineer's lines at Lucknow.—Presented by Mrs. Haynes.

(8372) Model of a Gotha bombing aeroplane.—Presented by Rear-Admiral The Hon. A. Stopford.

(8373) Engraving of Salter's " Waterloo Banquet."—Presented by Sir Herbert Read.

(8374) Collection of Medals.—Presented by Squadron-Leader J. M. Maxwell.

(8375) Model of a Pontoon Bridge.—Purchased.

(8376) Portrait in wax of the Duke of Wellington.—Presented by Her Majesty Queen Mary.

(8377) German crow's foot from the trenches N.E. of Arras.—Presented by Colonel J. Hastings.

(8378) Model of the " Scharnhorst " made by survivors of the " Gneisenau " when prisoners of war, out of a splinter of H.M.S. " Invincible."—Bequeathed by Lieutenant-Commander J. C. T. R. Borrett, R.N.

(8379) Coloured engraving of the British Fleet in Besika Bay, 1877.—Presented by H. H. Harrod, Esq.

(8380) Two boards of knots, splices, bends and hitches.—Made and presented by the Cadets of H.M.S. " Worcester."

(8381) Bowl of the compass which navigated H.M.S. " Vindictive " alongside the Mole at Zeebrugge, 23rd April, 1918.—Presented by Rear-Admiral W. Tomkinson, C.B., M.V.O.

(8382) Model of an Autogiro.—Presented by the Cierra Autogiro Co.

(8383) Collection of Medals.—Presented by Mrs. L. Lambert.

Loan

(3586) Gold ornament taken from King Coffee's Palace, Coomassie, by Lieutenant R. C. Annesley, 79th Highlanders.—Lent by Lieutenant-Colonel R. C. Annesley.

(3587) Case containing knife, pen and pencils, carried by the Duke of Wellington at the Battle of Waterloo.—Lent by G. W. Younger, Esq.

Ship Model Post-cards.

A series of photographic post-cards of selected models illustrating types of ships of the Royal Navy in the days of sail and in the present fleet are now on sale at 1s. per packet of eight—post free.

Attendance.

The amount taken for admission during the last Quarter was :—

£73 9s. 0d. in February.
£69 5s. 6d. in March.
£271 15s. 0d. in April.

Purchase Fund.

This Fund has been opened to assist in the purchase of new exhibits. The Council hope that it will receive the support of Members interested in the Museum.

	£	s.	d.
Balance in hand	47	13	3
B. E. Sargeaunt, Esq.	1	0	0
	48	13	3
Purchased :—			
Model of Minesweeper	10	0	0
	£38	13	3

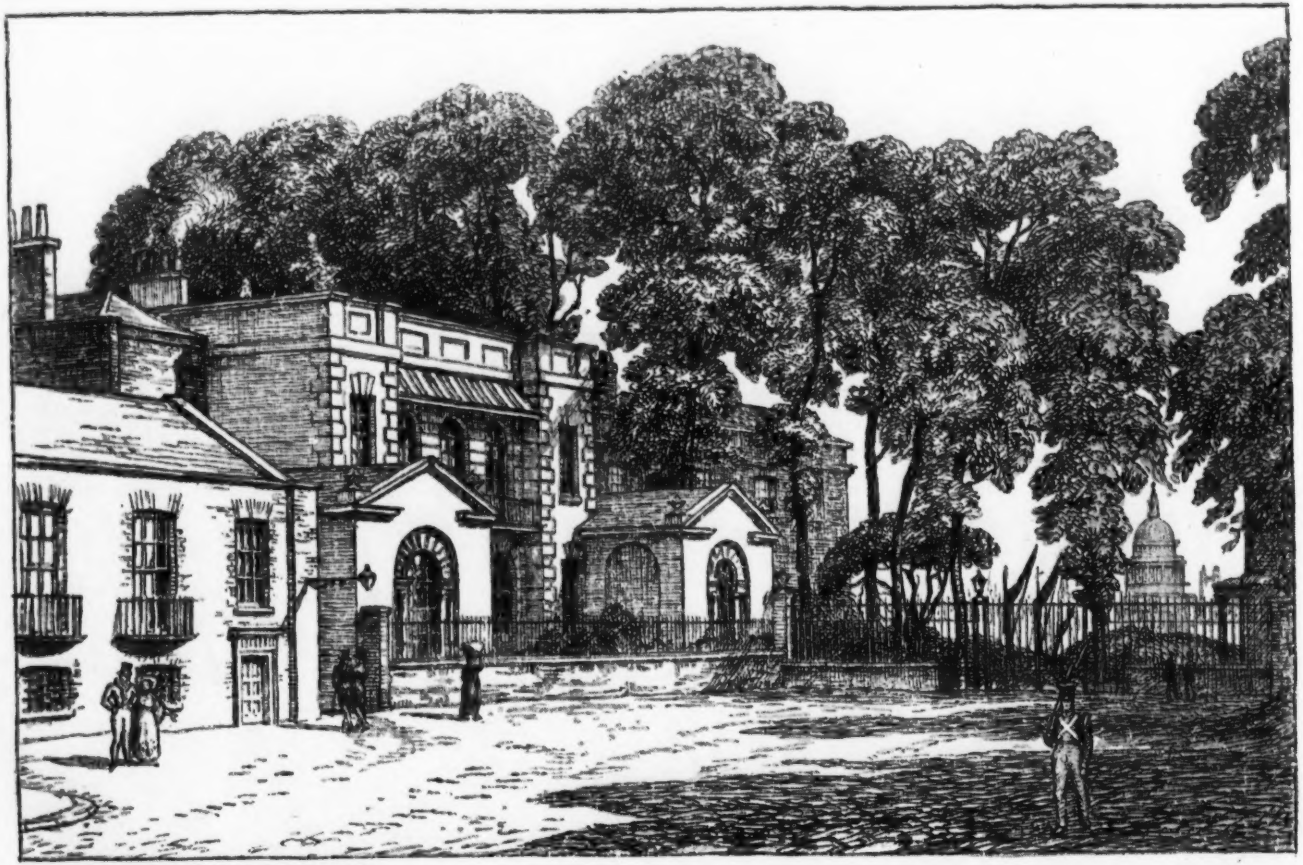
CHESNEY GOLD MEDAL

The Council has awarded the following Chesney Gold Medals : 1928, Mr. L. G. Carr-Laughton for his " Old Ship Figure-heads and Sterns " and as part author of " The Royal Marine Artillery " and other contributions to naval literature ; 1929, Colonel H. C. Wylly, C.B., for his " History of the 1st and 2nd Battalions, Sherwood Foresters," and for much valuable work in connection with other military literature ; 1930, Dr. C. E. W. Bean, for his " Official History of Australia in the War."

PREVIOUS RECIPIENTS

(With rank of officers at the time of the award)

1900. Captain A. T. Mahan, United States Navy.
1907. Major-General Sir J. F. Maurice, K.C.B., *p.s.c.*
1909. Hon. J. W. Fortescue, M.V.O.
1910. Sir J. K. Laughton, Kt., M.A.
1911. Professor C. W. C. Oman, M.A., F.S.A.
1913. Colonel Sir L. A. Hale.
1914. Sir Julian S. Corbett, LL.M., F.S.A.
1919. Major-General E. D. Swinton, C.B., D.S.O.
1921. Major-General Sir C. E. Callwell, K.C.B.
1924. Professor G. A. R. Callender, M.A., F.S.A.
1925. Captain Sir George Arthur, Bt., M.V.O.
1926. Vice-Admiral Sir H. W. Richmond, K.C.B.
1927. Brigadier-General Sir J. E. Edmonds, C.B., C.M.G.



Sketched from an old print by HUBERT WILLIAMS

THE NAVAL AND MILITARY LIBRARY AND MUSEUM, 1831

THE JOURNAL OF THE ROYAL UNITED SERVICE INSTITUTION

Vol. LXXVI MAY, 1931 No. 502

Centenary Number

[*Authors alone are responsible for the contents of their respective Papers. All communications (except those for perusal by the Editor only) should be addressed to the Secretary, Royal United Service Institution.*]

The Royal United Service Institution 1831-1931

By CAPTAIN E. ALTHAM, C.B., R.N.

Secretary, Editor and Chief Executive Officer

THE foundation of the Royal United Service Institution, like that of most great projects, seems to have been due to the enterprise of a few in uniting and giving effect to a considerable body of opinion, rather than to the inspiration of any particular individual. But credit must be given to a correspondent signing himself "An old Egyptian Campaigner," whose letter to the United Service Journal[1] of February, 1829, is the earliest record of anyone putting forward a concrete proposal for such an establishment. This worthy correspondent wrote as follows: " . . . my proposal is that to give a tone of science to the character of both Services, it would be a desirable point to set on foot a Museum, to be formed, conducted and maintained, solely by the military, medical and civil branches of the Royal Navy, the King's Army, the Hon. East India Company's services and their connexions; to be called the United Service Museum. I should hope this Museum, if patronized by His Gracious Majesty, as the head of the Army, by His R.H. the Duke of Clarence, and the actual heads of the Navy, would soon attain an interesting character, reflecting honour on the nation, raising in public estimation the individual contributors to and supporters of it, and finally proving that the two professions have entered the lists of science, and are ready to contend for honours 'tam Artibus quam Armis.' "

The suggestion of the "old Egyptian Campaigner" was warmly supported in a succession of letters, and before the end of the year 1829 a meeting took place in the Chambers of one Commander Henry Downes, R.N., who by his personal energy and interest seems to

[1] A publication founded in 1829 and not to be confused with the Journal of the Institution, which was not started until 1857.

have done very much to give practical effect to the various proposals. To this meeting came Sir Herbert Taylor, First Aide-de-Camp to His Majesty King George IV, to announce that "he had been honoured with His Majesty's commands to [convey to] those who might become members of the Institution, His Majesty's gracious and high approbation of the undertaking and of the principles on which it is proposed to conduct it." Encouraged by such august support, a provisional committee was formed forthwith, with Major-General Sir Howard Douglas[1] as Chairman.

This committee formulated certain principles which are adhered to both in the letter and in the spirit to this day. "The United Service Museum" it was decreed, "is intended to be strictly a scientific and professional society, not a club. Neither politics, gambling, eating nor drinking enter into its design, from which the two former are absolutely excluded on principle, the latter as interfering with the established objects of the United Service Clubs."

Early the following year, 1830, the provisional committee met again and received further Royal support in the form of a letter from H.R.H. the Duke of Clarence, expressing his readiness to become a patron of the United Service Museum. In June of that year George IV died, and the project hung fire until the Spring of 1831; but at a meeting on the 30th March of this year, a letter was received from Sir Herbert Taylor, saying that the Duke of Wellington had expressed his readiness to become a member of the proposed Institution, and that "having obtained so high and desirable a sanction" he, Sir Herbert, had submitted the project to the King (William IV) who had signified His pleasure "to continue to the undertaking and to the proposed society that patronage which he had expressed his intention of conferring on it as the Duke of Clarence." The letter further expressed the opinion "that we may commence an establishment under His Majesty's gracious auspices."

This encouraged the committee to press forward without further delay. On the 11th April, 1831, they approved a "Prospectus of the United Service Museum," which concluded with the declaration that "The chief aim of this Institution is to foster the desire of useful knowledge amongst the members of the United Service, and to facilitate its acquisition at the least individual or public cost." The annual subscription was fixed at ten shillings; life membership at

[1] Major-General Douglas was not only an officer of outstanding ability in his own Service, but had been intended for the Navy and had made a close study of naval tactics and gunnery. It was due in large measure to his Treatise on Naval Gunnery, published in 1820, that the "Excellent" Gunnery School was eventually founded.

£6. In considering this matter the committee announced that they proposed that the rate of subscription should be as low as possible, "so that the smallness of the amount might render it a matter of trifling import to the very junior officers of the Service, while the number of subscribers should produce a revenue equal to the wants of the establishment." It is interesting to note that within the last two years, the Institution has passed a Bye-Law waiving the entrance fee in the case of officers of less than three years commissioned service, thereby emphasising the original intention that "junior officers should regard the Institution as one in which they will be no less welcome and from which they will profit no less than their seniors."

THE FOUNDATION

At 2 o'clock on the 25th June, 1831, a distinguished company of naval and military officers gathered at the Thatched House, St. James's Street. This was a popular resort at the time; one of the chief taverns in the West-end, it had added to its premises a large room for public meetings, and this was for many years the scene of the convivial assemblies and dinners of such well-known bodies as the Navy Club, the Royal Naval Club, the Royal London Yacht Club, the Royal Society and many literary and scientific associations. It was, therefore, an appropriate place for the birth of our Institution.

The chair was taken by Major-General Sir Howard Douglas and the Resolution that the Institution "be now formed" was put to the meeting by Major-General Sir Henry Hardinge.[1] At Sir Henry's suggestion, the Institution was designated "The Naval and Military Library and Museum," instead of merely "The Naval and Military Museum." This was of some importance because it emphasized that the object of the Institution was not to be confined to making a collection of interesting exhibits, but as was originally proposed, essentially to include the study and advancement of professional knowledge. Captain Francis Beaufort, R.N.[2] in seconding the Resolution, expressed a hope that "our Library and Museum will detach many of our friends from the club-house and the billiard-table."

The Resolution having been carried, it was next resolved that "all officers of the Army, Navy and Marines, Militia (Regular and Local), Yeomanry, East India Company's Land and Sea Forces, and civil functionaries attached to those departments, be eligible to become Members."

[1] Afterwards the first Viscount Hardinge of Lahore and a Field Marshal. He was twice Secretary of State at War and a Governor General of India.

[2] Afterwards a Rear-Admiral and Hydrographer of the Navy.

Next in the order of the proceedings, we find the Duke of Wellington elected as the first Vice-Patron. The First Lord of the Admiralty, the Commander-in-Chief of the Forces, the Vice-Admiral of Great Britain, the Master General of the Ordnance, the Lord Lieutenant of Ireland, and the General of Marines, were appointed Presidents. The prestige of the Institution was further ensured by the election of no less than thirty Vice-Presidents, the list of which included many of the most illustrious names on the Navy and Army Lists of that date.

Finally, a working committee of thirty Members was elected, with Major-General Sir Howard Douglas as the first Chairman, Commander Henry Downes, R.N., and Lieutenant W. S. Hall, H.P. Royal Irish, as joint Secretaries and extra Members of the Committee, and Mr. Charles Downes as Treasurer.

So the Naval and Military Library and Museum was, in the words of the Chairman, duly "founded and constituted." Nearly two thousand officers were enrolled as Members within the first year, and gifts began to pour in at such a rate that the Committee immediately experienced what, in greater or less degree, has been one of the difficulties which has had to be met throughout the hundred years of the Institution's existence; the difficulty of housing its ever accumulating treasures and exhibits, and its wealth of books, pictures and other possessions.

THE FIRST PREMISES

The first house of the Institution was a small building in what was then called Whitehall Yard, and which occupied part of the site of the present War Office.[1] This building, the use of which was secured through the good offices of Sir Benjamin Stephenson, Surveyor-General to the Board of Works, was known as Vanbrugh House. Sir John Vanbrugh, the architect, man of letters and "comic poet," had built it for his own use out of part of the ruins of the old Whitehall Palace. It stood on what were once the quarters of the "Officers of the Jewel Office," and the "Quarter Waiters" of the Royal Residence, and had been an object of some amusement to his friends, who called it a "Pill Box," while Swift compared it with a "Goose Pie." The Government placed this house at the disposal of the Committee, free of rent, and it continued to form part of the Institution's buildings until 1895, when the great change-over to the existing premises took place.

In the report of the Council (as the original Committee was now styled) presented to the First General Meeting, special reference is

[1] See frontispiece to this Journal.

made to their efforts to acquire more accommodation. Incidentally, they paid tribute to the "many gifts of great beauty and value presented by ladies." In return for "an interest so flattering and advantageous to the Institution," they recommended that ladies should be eligible to become honorary Members. Nothing further seems to have been done in regard to this proposal, however, and the existing arrangements whereby ladies who are friends of Members may be introduced to the Museum and to the Institution's lectures is doubtless a more practical one than that suggested.

At the Second Anniversary Meeting, held on the 2nd March, 1833, the Council were able to report that the Government "at the express instance of the Sovereign, and with a due consideration of the public utility and benefit likely to result from the establishment of the Institution, have been pleased to grant it the use of a more spacious building." This had formerly been the office of the Board of Works, and was situated in Inner Scotland Yard. It was connected to Vanbrugh House by a passage; off this, and apparently between the two buildings, was a small house, on the site of which a lecture theatre was built some sixteen years later. While this evidence of His Majesty's interest and practical assistance by the Government were most gratifying, the Institution had to expend over £2,000 in adapting the new premises to its requirements and putting them into a state of repair. In 1844, the remainder of the lease of Lord Stuart de Rothesay's house—the small house in the passage-way—was purchased for £3,500, subject to an annual ground rent of £205. In the following year a further sum of over £1,000 was spent on adapting the new premises and linking up the separate houses. The lecture theatre, built in 1849-50 cost £1,500. In all there was an outlay of over £10,000 on the Institution's original premises during the first twenty years of its existence. It is not to be wondered at, therefore, that when in 1871 the Council received "notice to quit" within four months from the Commissioners of Woods and Forests by direction of the Lords Commissioners of the Treasury, very strong opposition was organized. A Memorial signed by H.R.H. the Duke of Cambridge, as President, was presented to the Lords of the Treasury, and this was followed by a deputation from the Council which was received by the Chancellor of the Exchequer—the Right Hon. R. Lowe. The notice to quit was withdrawn, but the Council were recommended to look for a more permanent site.

The whole position from now onwards evidently caused the Council considerable anxiety. It was clear that, sooner or later, extensive reconstruction would be carried out on the Crown Lands

surrounding the Institution, and that their existing premises would necessarily be involved. From time to time further reminders of impending plans for "dealing as a whole with the land adjacent to the Thames Embankment" were received, and the only consolation was an undertaking by the Treasury that "due notice would be given" and that the promise of assistance made to the deputation in 1872 "would not be lost sight of."

At last, when the situation was getting very critical, Her Majesty Queen Victoria was graciously pleased to grant the use of the Banqueting Hall, Whitehall, as a mark of Her Majesty's appreciation of the usefulness of the Institution in connection with the Naval and Military Services. By this Royal grant, both an ideal setting, and a permanent home, were provided for the invaluable contents of the Museum; but it was still necessary to acquire premises suitable for the literary and administrative requirements of the Institution. The Council were fortunate in being able to secure from the Crown an eighty years' lease of the ground adjoining the Southern end of the Banqueting Hall. On this site the present Institution was erected at a cost of £23,000. To meet this heavy outlay the Council made a special appeal to Members, to the Services and to the public. The subscription list was headed by Her Majesty the Queen, Their Royal Highnesses the Prince of Wales, the Duke of Edinburgh, the Duke of Connaught and the President—the Duke of Cambridge.

Designed by Messrs. Aston Webb & Ingress Bell, the building was commenced in 1892. The memorial stone was laid with great ceremony by H.R.H. the Prince of Wales on the 6th June, 1893, and the Institution as it now stands was formally opened by His Royal Highness on the 20th February, 1895.

TITLE AND ROYAL CHARTER

The title of the Institution was changed several times since the original "Naval and Military Library and Museum" adopted at its foundation. In May, 1834, the name was abbreviated to the "United Service Museum," but five years later the Council came to the conclusion that this "imperfectly expressed the objects of the Society," and the name was changed to that of "United Service Institution"; so it remained until the Royal Charter of Incorporation was granted in 1860, when the present title was bestowed.

The decision to apply for a Charter was arrived at during a Special General Meeting called on the 25th March, 1859. At this same meeting the Bye-Laws were also revised including that relating to the "design," or object of the Institution. Hitherto this had been defined

as "a Central Repository for objects of Professional Art, Science and Natural History, and for books and documents relating to those studies, or of general information." This was now changed to the "promotion of Naval and Military Art, Science and Literature," which, in the Royal Charter, became "the promotion and advancement of Naval and Military Science and Literature," a concise and practical definition of the objects for which the Institution exists and which is retained to the present day. The Council recently considered the question of applying for an amendment to the wording of the Charter so that air interests should be included, but in view of the Service character of the Institution, it was considered that the term "military" in its comprehensive sense covered all forms of science and literature relating to the Services, and, therefore, no change was called for.

ROYAL PATRONS

Since the time when George IV supported the proposal to form the Institution and William IV became its first Patron, the Institution has enjoyed the continued patronage of the Sovereign. On the death of William IV in 1837, Her Majesty Queen Victoria became the Patron, and in 1842, H.R.H. Prince Albert became joint Patron with the Queen. The Prince Consort was a warm friend to the Institution and took a great personal interest in its progress. He went with the Queen when they paid a long visit to the Museum in its old home.

His Majesty King Edward VII became Patron on his accession in 1901. As Prince of Wales he had been a Vice-Patron since 1859. The interest which he showed in the work of starting and opening the new building continued after the Institution and its Museum were finally installed in their new home, to which he paid several visits. The Museum is indebted to him for a number of valuable and interesting gifts.

His Majesty King George V has been Patron since his accession, in 1910. Before that, he had been Vice-Patron since 1901. He honoured the Institution by a visit in March of this, the Centenary year. Her Majesty the Queen, who accompanied the King on this occasion, has shown her special interest in the Museum by sending every year, for some years past, some gift of historical interest to be added to the Institution's collection.

His Royal Highness the Prince of Wales has been Vice-Patron since 1920.

PRESIDENTS

The first President, the Duke of Wellington, retained office until his death in 1852, when he was succeeded by that Duke of Northumberland who is mentioned in the Royal Charter. On his death, Lord Hotham was elected President; but he died only four years later and was succeeded by the Duke of Cambridge. His Royal Highness presided over and took a very active part in the Institution's affairs for the greater part of thirty-two years. It was very largely due to his efforts that the existing permanent quarters were secured.

His Royal Highness the Duke of Connaught has been President since 1905.

THE MUSEUM

From its earliest days the Museum has been regarded as a most important feature of the Institution, but the character of its contents has changed somewhat in the course of years. In the original scheme, natural history was given considerable prominence, and very many of the first gifts bore witness to the prowess of officers of both Services as sportsmen, and to their industry as naturalists in every part of the world. In course of time, however, the more professional side of the Institution made insistent demands on space and the stuffed birds, quadrupeds and fishes, entomological specimens, shells, dried ferns and such-like articles had to make way for more professional exhibits. In 1860 the whole collection of natural history specimens was sold. The sum realised was £218 6s. 8d., which, curiously enough, just covered the expenses involved by the grant of the Royal Charter, although the sale had no relation to that important event.

A special committee, appointed by the Council in 1891, enquired into the whole administration of the Institution, and that part of their report which referred to the Museum recommended that it should be "as much a model room of the present as a show of historical antiquities and relics of the past"; and this is the policy which the Council is pursuing to-day. The grand old Banqueting Hall[1]—the scene of many dramatic events in our national history—hung round with colours and ensigns, and crowned with its magnificent Rubens ceiling, must always remain what it now is, a perfect setting for mementoes of the glories of the past. Here are personal links with famous commanders, trophies of great victories and of heroic achievements by land and sea, and national treasures to inspire the rising

[1] The history of the Banqueting Hall, part of the old Palace of Whitehall, is dealt with in a separate article. See page 246.

generation with the spirit which made the Empire. Here, too, are very beautiful models recalling the romantic ships of Nelson and earlier times. Side by side with them are the picturesque old uniforms and head-dresses, the weapons and equipment of our armies from Wellington's days, back to the cross-bow. This is no place for the crude materialism of steam warships, mechanized artillery or the ultra modernist aeroplane; it is indeed a cloister in which to meditate upon those noble traditions which have been handed down to us, and the responsibilities which are inseparable from them.

The Crypt, below, however, with its simplicity and severity, is entirely suitable for the more modern exhibits which it now contains. This part of the Museum has been considerably altered of late years, and the contents are gradually taking the form of models, or full size articles representing the Services of to-day. The latest types of warships, tanks and aeroplanes in miniature, specimens of the latest shells, the largest bombs, an up-to-date diving equipment, and a model of a new military bridge, are typical of the many exhibits which are carrying out the Institution's mission of giving the public an insight into the Navy, Army and Air Force as they are now. The Crypt is not wholly devoted to present day exhibits, however, for it also houses relics and models of the Great War, the South African War and the Crimea. In the naval section, too, there are ship models showing the gradual development of the steam man-of-war, and on the military side there are exhibits showing various stages in the progress of artillery and machine guns. In fact, the Crypt as now organized, carries on the history of the Services as it is portrayed in the Hall above, and brings it up to date in a form which will appeal to a more mechanical age.

THE LIBRARY

A Library of professional works was, no less than the Museum, regarded as an essential part of the Institution from the time of its foundation. To-day the Library contains the finest collection of such books in this, or in all probability, in any other country, including many rare old editions of publications long since out of print. It is conducted on the principle that every and any work of value to the Services will be secured, and that sufficient copies shall be available to ensure that at no time will there be a long waiting list.

THE JOURNAL

In 1857, through the good offices of Lord Panmure, the late Secretary of State for War, a grant of £400 per annum was made to

the Institution by the Government. This enabled the Council to give effect to what had long been one of their ambitions: the publication of a Journal. It was the intention that three or four numbers should appear every year, and that they should contain the lectures delivered at the Institution, reports of the Proceedings, etc. The Journal was to be "a professional and scientific periodical, useful, instructive and interesting, worthy of the Institution and Services . . ."

It was recognised that such a publication was indispensable if the Institution was to carry out its mission properly; moreover, it became increasingly obvious that the interest and support of Members who did not live in London could only be secured by some such means.

From humble beginnings the R.U.S.I. Journal has become the leading publication of its kind in this or any other country. To-day it affords to the officer who has little time for newspaper reading, a ready means of keeping himself informed as regards those changes in international affairs which may affect Imperial defence and the responsibilities and future of the Navy, Army and Air Force. In its pages, too, he now finds lectures and articles by the best authorities on scientific and other developments which may influence the conduct of future warfare; while other contributions by his confreres are of a kind to encourage him to take pen himself and join in discussions on subjects of general Service interest. As a guide to what new books are worth reading, the Journal is a further help to the student of military affairs; the Notes of all the most important events in the Services form an invaluable record for the historian.

The traditional embargo on politics and personalities is maintained, but with this proviso, the high authorities to-day are more benevolent in facilitating publication of contributions by serving officers than was ever the case in the past. The historical side of the Institution is by no means forgotten, but it is recognised that the Journal should be a place for new ideas, or at least for presenting old facts in such a light that they are helpful in the solution of the problems of the future; space cannot, therefore, be given up purely to "fighting battles o'er again."

Both in the Journal and the Discussions which take place after the lectures, the Institution welcomes original and imaginative contributions from its younger Members, even if it still relies for guidance in its affairs on those with riper experience.

THE INSTITUTION TO-DAY

In this brief review it has not been possible to do more than touch lightly on how the Institution came to be formed and to note some of the principal events in the hundred years of its progress. It has been impossible, even by mentioning their names, to pay tribute to the innumerable distinguished officers and enthusiastic supporters who, through fair weather and foul, have carried the project launched in 1831 to success. They have bequeathed not only to the fighting Forces, but to the British people all the world over something in the nature of a memorial, within which is enshrined those personal relics of our most renowned warriors, those trophies of our most memorable victories, those associations with the ships and weapons of by-gone days which recall the valour of our forefathers and the traditions of our race. They have provided an organization which, while it enjoys the support of the highest authorities, is yet free to follow the bent of its members in "promoting and advancing naval and military science and literature" in such fashion as seems best to them. Lastly, they have passed down to the present generation an inheritance which stands pre-eminently for the good of those Services on which, ultimately, the security of the Empire and the consequent peace of the World must continue to depend.

The Banqueting House of Whitehall Palace

By EDWARD FRASER.

THE Banqueting House of the Palace of Whitehall, in which the Museum of the Royal United Service Institution has been housed for the past thirty-six years, "stands for us," it has been said, "as the sole relic of a Whitehall that never existed, and also as the sole relic of a Whitehall that was." It was designed and built by Inigo Jones, the great predecessor of Sir Christopher Wren, between 1619 and 1622, in the reign of James I. King James intended that it should form one of a set of stately edifices with which he proposed to replace the original Tudor Palace of Whitehall, partially destroyed by fire a short time before. The Banqueting House was the only one of the extensive range of noble buildings designed by Inigo Jones ever built. Lack of funds prevented the King's project from ever being carried out, although elaborate drawings of the intended Palace were made, and still exist.

Five Banqueting Houses, each forming part of Whitehall Palace, had previously occupied the site. Three of them were only temporary lath and plaster and canvas erections, constructed for special State festivities in Henry VIII's reign and during the first twenty years of Queen Elizabeth. The fourth Banqueting House was a solid timber and stonework structure, built in 1581, when an embassy from France was expected; sent over to propose a marriage between the Queen and a French royal prince, the Duc d'Alençon. Her virgin Majesty, however, did not care about a matrimonial alliance with "that poor frog," as she called her rejected suitor, and, during the remainder of Elizabeth's reign, the building was used for State receptions, meetings of the Queen's Council and Court revels. James I, during his first three years, used it mainly for his carousals, to make it suitable for which, His Majesty in 1604, as an existing official document records, "commanded the erection of a Bottle House beneath the Banqueting House."

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ROYAL UNITED SERVICE

ERVICE INSTITUTION, 1931

From the original sketch by Hubert Williams

The quarter of a century old edifice began in 1605 to show signs of collapse, and the fifth Banqueting House, made larger and of stone was ordered to be built. This was completed within two years, and was opened in January, 1608, with Ben Jonson's "Maske of Beauty," in which Queèn Anne, the Royal consort, herself acted. It is recorded that in May, 1607, while the masons were still at work, the King and Queen spent a morning, seated on the scaffolding, watching the antics of "A dancing Bere and Goate" (*sic*) in the open space in front. The Banqueting House during the next ten years was the scene of King James's notorious drinking bouts with the King of Denmark, masques and stage plays, receptions of embassies, and, in December, 1613, of the formal bethrothal of the King's daughter, the Princess Elizabeth, destined to be the hapless "Winter Queen" of Bohemia, to the Prince Palatine. It finally perished by fire in the early morning of 12th January, 1619, together with the adjacent palace buildings. One contemporary writer says that two workmen set fire to the place while looking for something with a lighted candle, which ignited some scenery, left stacked after a Christmas stage play in readiness for a Shrovetide performance. The pair were alone in the building, and on seeing the flames, ran away, shutting the outer doors and giving no alarm. Another letter-writer says that a burglar, also poking about with a lighted candle, caused the fire and similarly made off secretly. "The fire," records Stow in his *Annals*, "raged from end to end and side to side of the palace before it was discerned."

King James directed that Whitehall Palace should be rebuilt, and instructed Inigo Jones, "Surveyor of the King's Works," to submit plans and a statement of the probable cost. The City of London is said to have offered the necessary funds, but the King declined the offer. Inigo Jones presented his designs for the whole new palace on 19th April, estimating the expense of completing the Banqueting House by itself at £9,850. He was ordered to proceed forthwith, and on 1st June, 1619, the first stone of the Banqueting House was laid. A Treasury windfall, in the shape of £1,000 in cash, paid the way at the outset; this was part of a fine inflicted by the Star Chamber on a lady at Court who had quarrelled with and falsely accused another Court lady of forgery. The building was hastened on, and in spite of a strike of workmen, was completed by 31st March, 1622. So eager was the King to use the Banqueting House that, while it was still incomplete, he held a St. George's Day Banquet in it on 23rd April, 1621. In 1623 he gave a State audience to the Spanish Ambassador there, together with a Court entertainment. The total cost, when presented in 1623, far exceeded Inigo Jones' estimate; it amounted to £14,940 4s. 1d. One of the extra items was a charge

of £712 19s. 2d. for "making a new peere (*sic*) in the Isle of Purbeck for conveyance of stone from thence to Whitehall." Stone came also from quarries in Oxfordshire, Northamptonshire and Yorkshire. The cost of the Banqueting House was eventually paid by instalments, the final payments being made on 29th June, 1633, ten years after the work had been finished and eight years after King James was in his grave.

The interior walls of the Banqueting House remained for years of bare stone, and the ceiling inside of plain woodwork. The Rubens canvases, now covering the ceiling, were not set up until 1635. They were first suggested in September, 1621, while the Banqueting House was being built, during a visit to London by Rubens and Vandyck. The royal favourite, the Duke of Buckingham, a friend of Rubens, arranged a discussion of the proposal with the King and Prince Charles, Prince of Wales, and a letter from Rubens to King James and the Prince is extant, saying that Rubens was "always ready to receive their commands." Nothing, however, resulted for eight years. In 1629 Rubens, who, besides being an artist was professionally an eminent diplomatist, came to England at the head of an embassy, and Charles I revived the project of decorating the Banqueting House ceiling with paintings. Rubens now undertook to do the work for £3,000. At the same time Vandyck, who again came over with Rubens, proposed to paint the "History of the Order of the Garter" on the walls of the Banqueting House. He made a sketch of his proposed pictures, which the King suggested should be represented in tapestry instead. The idea was given up owing to the great cost of the tapestries, which Charles insisted on having instead of the paintings. Vandyck's sketch is now at Belvoir Castle in the Duke of Rutland's collection. Rubens made his designs for the ceiling at Whitehall. The paintings were executed at Antwerp during the following five years, in intervals of his diplomatic missions, and with the assistance of his pupil, Jordaens. They were finished by July, 1634, after which they remained rolled up in a storehouse at Antwerp for a year, King Charles being unable to find money for Rubens' fee and the Dutch Government's export duty. The delay became a public scandal, until the King arranged with Rubens for payment by instalments, after which the Antwerp Custom House authorities consented to forego their claims. The paintings were found to have been damaged through damp while lying rolled up, but Rubens repaired and repainted the injured parts, and in October, 1635, the canvases were at last shipped to London. King Charles, to show his relief, presented Rubens with a gold medal and chain.

He could not, however, manage to pay off the final instalment of Rubens' fee until June, 1638, three years later.

The ceiling, as designed and painted by Rubens, and as it is now, is divided into nine panels, set in a richly moulded gilded framework. The oval centre panel represents the Apotheosis of James I. It shows the King shaking off the troubles of this world (typified by a globe), and ascending to heaven on the wings of an eagle, intended to symbolize Justice. The two oblong panels on either side of the oval centre typify, the one Peace and Plenty, the other Harmony and Happiness, politely considered characteristics of James I's reign. The two large panels at either end typify: the one, the birth of Charles I, with King James on his throne pointing to the infant, who is being perfected by Wisdom; the other, King Charles's accession, the monarch being shown embracing the Goddess of Wisdom and overcoming Envy and Rebellion. The adjacent smaller oval panels are intended to typify respectively the triumph of Virtue over Vice. The ceiling has undergone restoration five times: by Kent in George II's reign; by Cipriani in George III's reign; under the direction of Sir Robert Smirke in William IV's reign, when the Banqueting House was repaired and restored during the eight years between 1829 and 1837; then, later on in the XIXth century; finally in 1906 and 1907. On this last occasion the paintings were taken down, and renovated and remounted.

Originally the windows of the Banqueting House on the West front, facing the present Whitehall thoroughfare, were blank, being filled up with masonry. An engraving of 1713 by Terrasson shows all these windows blocked in, and prints published in 1761 and in 1773 show the windows still blank, with the exception of the centre one on the first floor. A print of 1781, and a plan of the first floor dated 1796, "by J. T. Groves, Architect and Clerk of Works at Whitehall," show four first-floor windows blank; the two on either side of the centre window. Presumably all the window spaces of the fourteen large windows on the West side were not opened and glazed until the extensive restoration operations between 1829 and 1837. The lower tier of small windows on the ground floor remained blocked up and unglazed until the Council of the Royal United Service Institution took over the building thirty-six years ago. The great window at the southern (Westminster) end of the Banqueting House was apparently open and glazed from the very first. There is some uncertainty in regard to the dates of opening of the various windows on the eastern front—the side towards the river: possibly, as facing the residential quarter of the palace, they were open and glazed at an early period.

The Banqueting House, during the first ten years of Charles I's reign, was repeatedly the scene of resplendent Court festivities and revels, and particularly of gorgeous masques and stage-plays, in some of which King Charles himself, with gentlemen of the Court and Queen Henrietta Maria with her ladies, took part. The setting up of the Rubens paintings stopped the masques and other evening entertainments in the Banqueting Hall. It was found that the smoke from the lamps and the flambeaux that were used tended to injure the delicate colouring. A temporary wooden building was, in consequence, erected for the displays in the adjacent palace grounds.

We come now to the outstanding historic event in the annals of the Banqueting House—the beheading of Charles I on 30th January, 1649. King Charles stepped out on to the scaffold through a gap made by breaking down a narrow window on the west face of a small building, which at that period adjoined the North end wall of the Banqueting House (the end towards Charing Cross), "the window frame being taken out purposely to make the passage." It was, in fact, approximately over the present main entrance doors to the Royal United Service Museum, but the original wall has gone and the face of this extension to the main building was set further back from the street to form the existing small courtyard.[1] The scaffold was erected at the northern end of the West front of the Banqueting House, set up there in order that the King should be beheaded, according to the words of the death sentence, "in the open street before Whitehall." The scaffold extended in front of the present two large first-storey windows at the northern end of the building, the block, it would appear, being just in front of the second window. The block, according to one contemporary wood-engraving, was low, and only a few inches above the scaffold floor, "whereunto they fixed several staples of iron and prepared cords to tye him down to the Block had he made any resistance to that cruel and bloody stroke"; so says the historian, Dugdale, who lived at the time, in his *Troubles in England*. On the other hand, there is in existence an engraving of an oil painting by Kneller, depicting the scene at the execution of King Charles; this shows a block of regulation size and two feet high, with scooped out neck and shoulder cavities, exactly like the block now in the Tower used for the execution of Lord Lovat in 1747, the last execution of the kind. The engraving is of further interest in that it shows the formed up cavalry and infantry guard on three sides of the scaffold, and the crowd massed in the street in front and at windows and on roofs of houses opposite. For years afterwards, a stone, let into the pavement immediately below the window, marked

[1] There is a model showing the Banqueting House with the scaffold, and Whitehall Palace as it was at this time, in the R.U.S. Museum.

the spot above which the block stood, "a blue stone, placed lozenge-wise, most likely slate or lias."

The Banqueting House during the five years of Cromwell's Protectorate, between 1653 and 1658, while he resided in Whitehall Palace, formed the setting for memorable historic occurrences, in addition to routine uses such as the holding of conferences with Committees of Parliament, the reception of embassies and entertainments to State officials. It was there that, in December, 1653, Cromwell received the Address of Congratulation from the City of London on his becoming Lord Protector. There in January, 1657, he received the congratulations of Parliament on his escape from assassination. In the Banqueting House, on 11th April, 1658, Cromwell received the deputation from Parliament, asking him "to consent to assume the title of King as a name known by the Law," and there, three weeks later, on 8th May, having meanwhile learnt that his Major-Generals objected, Cromwell, before the same deputation, formally declined the Crown.

In the Banqueting House at the Restoration, Charles II, on the evening of the day he made his State Entry into London, received the Address of Loyalty and Welcome from both Houses of Parliament. There also he held the St. George's Day banquets of the Order of the Garter; on one occasion in 1667, "each Knight having forty dishes to himself, so that they were piled five or six high." The old-time semi-religious royal ceremony of "Touching for the King's Evil" took place in the Banqueting House, Charles "stroking their faces while prayers were read and psalms." On one occasion, in July, 1664, King Charles gave one of his courtiers leave to hold a "sweep" or lottery in the Banqueting House, in which His Majesty himself and the Queen and the ladies of the royal suite took part. According to the diarist, Evelyn, it was "contrived very unhandsomely, the master of it was in truth a mere shark!" Sales of paintings were also, by royal permission, held in the Banqueting House: one in 1680, of Sir Peter Lely's private collection; next, a sale of Lord Melfort's pictures, "seized to satisfy his creditors"; and, during William III's reign, an auction of General Talmash's pictures, sold after the death of Talmash (or Tollemache) from wounds received in action.

When and why the celebrated vane on the Banqueting House was erected is not clear. According to tradition it was at the order of James II in the autumn of 1688, when the sailing of the Prince of Orange's fleet and army of invasion was expected. Macaulay, who searched every contemporary source of information for his history,

does not refer to it: he speaks only of a crowd in Cheapside watching the dragon-vane on Bow Church steeple for the prevailing westerly wind to change to the East and become what they called a "Protestant Wind." Apparently the first mention of James II in connection with the Banqueting House vane is in a French book published forty-one years afterwards, in 1729—*Nouveau Théatre de la Grande Bretagne,* The passage runs: "La Girouette qui y est, fut mise par le Roy Jacques Second en 1787 (*sic*) afin de voir de ses Apartement si le vent etoit favorable pour la flotte du Prince d'Orange." The first extant representation of the vane is in the 1713 engraving of the Banqueting House by Terrasson, which shows the vane in its present position.

The last State Ceremonial held in the Banqueting House before the great fire of 1698, which made an end of Whitehall Palace, was the holding there of the "Grand Convention of the Lords and Commons of England" on 13th February, 1689, to offer the Crown to William and Mary, Prince and Princess of Orange.

In the fire of 4th January, 1698, the Banqueting House was the only part of Whitehall Palace that escaped, and that was only with difficulty. Everything else, from the present Old Scotland Yard on one side, to Montague House, at the far end of Whitehall Gardens, on the other, was totally destroyed. Sir Christopher Wren claimed the credit of saving the Banqueting House. The flames, blazing furiously, had reached the buildings adjacent to its South (Westminster) end, and the whole edifice appeared doomed. In a last forlorn attempt to prevent the flames bursting through to the interior of the Banqueting House, Wren collected masons who, at considerable personal risk "in a very dangerous place," managed hastily to brick up the great south window and keep the flames out. Beyond being badly scorched the Banqueting House escaped. "The Banqueting House," says Macaulay, in describing the palace ruins after the fire, "was safe, but the graceful columns and festoons designed by Inigo were so much defaced and blackened that their form could scarcely be discerned."

King William, who during the day and a half that the fire lasted was at Kensington Palace ill in bed, was specially concerned about the saving of the Banqueting House, and kept sending messengers every few hours "urging various measures for its preservation." Shortly afterwards, on seeing the charred ruins of the palace, the King directed Wren to set about repairs of the Banqueting House with a view to converting it into a chapel. The work was taken in hand, and by the following June the Banqueting House had been fitted up within for religious services. It was not, however, either then

or later, consecrated nor dedicated. The only incident of any note during the next twenty-six years—until 1724, when George I commanded that "Whitehall Chapel" should be styled thenceforward "The Chapel Royal of Whitehall"—was the marriage there in 1723 of a grandson of Oliver Cromwell. George I also directed the creation of a complete ecclesiastical establishment for the Chapel Royal, including twenty-four "select preachers," to be on duty in pairs every month and sent from Oxford and Cambridge alternately. Defoe, who was present at the opening service on Easter Day, 1724, and often afterwards, writes thus of the changed state of things :—

"Above, we view the Bacchanalian King,
Below, the sacred anthems weekly sing."

From 1724 until the later years of Queen Victoria's reign, the Chapel Royal, Whitehall, was the scene of the annual distribution of the Royal Maundy, the gifts being distributed to deserving poor men and women, in number corresponding with the years of the sovereign's age. In the former Banqueting House days there had been one such distribution, in 1693, when, by command of Queen Mary, the Royal Maundy was distributed there. At first, and until Queen Victoria's reign, the royal bounty was given in kind as well as in cash. In 1731, for example, forty-eight recipients were given "boiled beef and shoulders of mutton, fish and loaves, and small bowls of ale, after which were distributed to them shoes, stockings, linen, woollen cloth and leather bags, each containing penny, twopenny, threepenny and fourpenny pieces and shillings, amounting to about £4." After 1838 only clothing and money were given. The Chapel Royal was also used for Handel Festivals, the most noteworthy being "a performance in the grand style" before the King and Queen and five princesses in May, 1796.

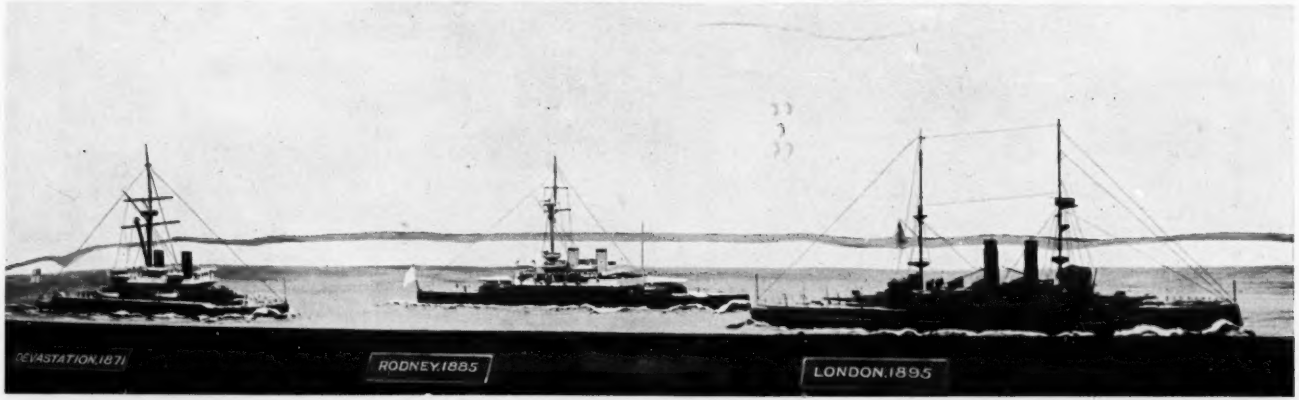
The Chapel Royal, in 1809, was altered inside for use as a military chapel for the Guards battalion quartered in billets in Holborn and Westminster; a gallery being built along the sides, about half-way up between the floor and the present gallery. The only barracks then existing in London were at Knightsbridge and Portman Street and in the Tower; the greater part of the Brigade of Guards were billeted in Holborn, Westminster and Chelsea, with assembly places at certain fixed points in their districts. The Napoleonic eagle-trophies, captured in the Peninsular War, in the West Indies, and at Waterloo, were displayed in the Chapel, ranged in front of the gallery, for upwards of fifteen years. They were there until 1829, when, on the building being closed for restoration, the eagles were removed, first to the old Guards' "Armoury" in Bird Cage Walk, then for

a year to the newly-built Wellington Barracks, finally, in 1835, to Chelsea Royal Hospital. In the military chapel a series of concerts and musical festivals were held during the summer and autumn of 1814 to raise funds for the relief of inhabitants of Germany who had suffered losses during the Napoleonic War.

King William IV and Queen Adelaide were present at the re-opening of the Chapel Royal in the Spring of 1837. Since then, other notable royal events have been the attendances at Divine Service there of King Edward and Queen Alexandra, as Prince and Princess of Wales, shortly after their marriage; again, in celebration of their Silver Wedding; again, at the time of Queen Victoria's Jubilee. Ordinations of Bishops took place from time to time at the Chapel Royal, Whitehall, down to December, 1868; and, from 1864 to 1890, the Boyle Lectures, "to prove the truth of Christianity against notorious infidels, being Atheists, Theists, Pagans, Jews and Mahometans," were regularly delivered there.

The Chapel Royal ceased to be such in October, 1890. In that month Her Majesty Queen Victoria, in response to a request in the previous July by the Commissioners of the Chapel Royal for permission to discontinue Whitehall Chapel as a place of worship and allow its use as the future home of the Royal United Service Institution Museum, graciously consented to give the use of the building to the Council of the Institution.

SAIL AND STEAM

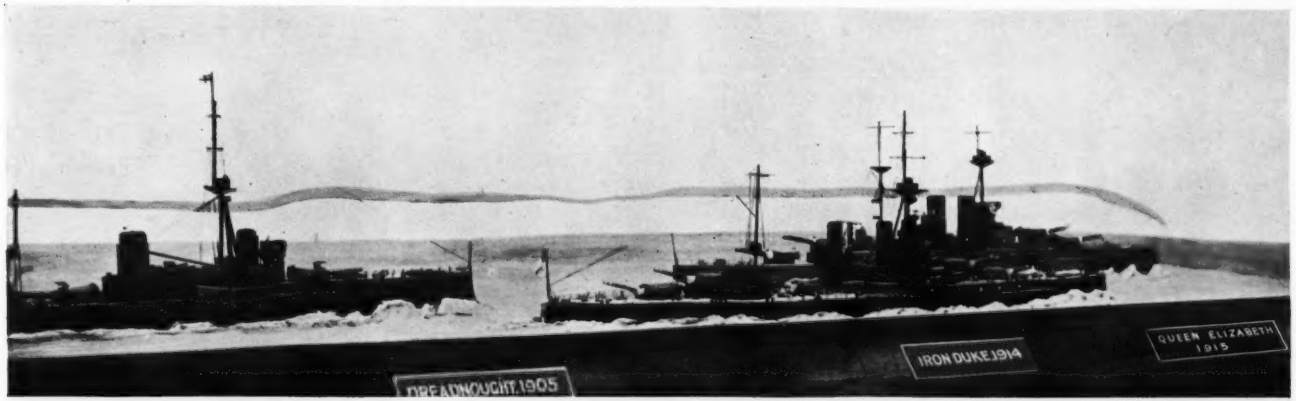


Photographs by courtesy of "The Times."

PRE-WAR TYPES

Ship Models lent by The Department of Overseas Trade.

A HUNDRED YEARS OF THE ROYAL NAVY



BATTLESHIPS IN THE GREAT WAR

Photographs by courtesy of "The Times."

THE NAVY OF TO-DAY

Ship Models lent by The Department of Overseas Trade.

A HUNDRED YEARS OF THE ROYAL NAVY

A Hundred Years of the Royal Navy

I. PERSONNEL AND ADMINISTRATION

By COMMANDER W. N. T. BECKETT, M.V.O., D.S.C., R.N.

THE personnel of the Navy in 1831 was very much the same in character as it was at Trafalgar, and there were many living who had fought under Nelson. One of the most notable survivors of his days was Vice-Admiral Sir Edward Codrington, G.C.B., the fourth Chairman of the Royal United Service Institution. Another was Vice-Admiral Sir William Parker, K.C.B., who was well known as one of the younger and more famous of the great Admiral's frigate Captains. The reigning sovereign, William IV, had been closely associated with naval administration when, as Duke of Clarence, he had held the post of Lord High Admiral. On his resignation, that office was merged into a Board of Commissioners which have executed it ever since.

THE OFFICERS

In 1837 a Royal Commission was appointed to enquire into the question of naval and military promotions and retirements, and duly commenced its labours under the chairmanship of the Duke of Wellington. The result of their investigations brought to light a remarkable state of affairs in regard to the Officer's List of the Navy. The Commission, in their Report remarked that "by detailing, where the official records enable us to do so, the ages and services of the several commissioned officers of the Navy as they have been reported to us by the Board of Admiralty [it is fully admitted], that a much larger proportion of inefficiency is to be found in the various ranks in the Navy than we have discovered in any of the other Services." This is hardly surprising when we find that the Admirals' list consisted of one above ninety years of age, seven between eighty and ninety years of age, twenty-five between eighty and seventy, seven between seventy and sixty-five, and one, the youngest, who was sixty-five, making a total of forty-one. Of Vice-Admirals, one was above eighty years of age, and of fifty-four on the list the youngest was fifty-four. Of Rear-Admirals, one was above eighty years of age

and the youngest above fifty, with sixty-four on the list. The Captain's list showed one above ninety years of age, while the two youngest were only thirty; the list totalling 670. Of Commanders, six were between eighty-one and seventy-six, and one was below twenty-six years of age; the total being 807. Eleven Lieutenants were between eighty-one and sixty-three; twenty were less than twenty-two; the total was 2,879.

Prior to this Royal Commission, so long as an officer's name was on the list, he could be called upon to serve, and infirmity alone was regarded as a reason for retirement, except for those, and they were comparatively few, who had private means. As regards the proportion of officers on full pay, the Royal Commission found as follows:—Captains, one in eleven; Commanders, less than one in ten; Lieutenants, one in six. No less than 313 Captains, 402 Commanders, and 530 Lieutenants had never been able to obtain appointments afloat in their respective ranks.

The scheme of entry for executive officers at this time was the old system of Volunteers, who were afterwards known as Naval Cadets. In 1854, however, the first Cadets' training ship, the "Illustrious," was commissioned at Portsmouth. New regulations for entry and training were issued in 1857, and two years later the "Britannia" relieved the "Illustrious." This ship in turn was condemned in 1869, and replaced by a new "Britannia" which, with the exception of a few cadetships from the Mercantile Marine training ships "Conway" and "Worcester," was the regular source of supply of executive officers until 1904. In that year what was known as the "Osborne" scheme was introduced, and Cadets went first to the Naval College in the Isle of Wight and then to that at Dartmouth, the latter having replaced the "Britannia." In 1913 an additional means of entry was provided whereby boys were received from public schools and went direct to a sea-going training ship, H.M.S. "Highflyer." Osborne College was closed in 1921, and from then onwards Dartmouth College and the public school entry have continued to supply the Navy with officers. A limited number of cadetships are also granted to boys from the Mercantile Marine training ships "Conway" and "Worcester," from the Nautical College at Pangbourne, and from the South African training ship "General Botha."

The state of affairs in the non-executive branches of the Navy was also reviewed by the Royal Commission of 1837, and of these the most interesting, perhaps, was that of the Pursers. In 1693 the Purser of a First Rate was allowed £4 19s. 0d. per month, including 19s. for paying his servant. This scale graduated down to £2 19s. 0d.

per month for a Purser of a Sixth Rate. These scales of pay continued until 1802 when 10s. to 15s. per month was added according to the rate of the ship. A further addition of 6s. per month was made in 1806, and in 1824 a flat rate of £7 per month, or £91 5s. 0d. a year, was granted to all Pursers. From the evidence of "Mr. George Voller Oughton, Esq., Purser Royal Navy" we find that as a general rule a Purser made approximately £1 per man per year for the complement carried, and considerably more when supernumeraries were borne, and that the custom of the Service enjoined that the Purser's clerk should receive private pay from the Purser at the rough rate of a pound for every gun carried by the ship. Mr. Oughton also alleges that, owing to the destruction caused by vermin, etc., Pursers were frequently brought in debt to the Crown, but that he knew of very few cases of Pursers being tried by court martial.

The Royal Commission decided in their recommendation that the lot of the Purser was no easy one, and that he was, in fact, forced to falsify his accounts by reason of the laxity of such regulations as existed and the custom of the Service which dated from time immemorial. It is to Mr. Oughton's credit that he advocated a readjustment of the regulations and was at pains to point out the disadvantages both to the Crown and to the Purser under the regulations and customs in force at that time.

The Pursers' lineal descendants, the Paymaster branch of to-day, have many more duties and responsibilities than their old-time predecessors. Not only are they the Accountant Officers of their ships, but in addition to the stores—clothing and provisions—charge of which they have inherited, they are now responsible for all stores—Boatswains, Gunners and Shipwrights[1]—with the exception of those belonging to the Engineers department. The Paymaster Cadet, as he is now called, comes into the Service under the same conditions as the public school entry for Naval Cadets. He goes direct to the training ship, H.M.S. "Erebus," for two terms, and is then appointed to a sea-going ship.

The Paymaster branch also provide that time-honoured member of an Admiral's personal staff—his Secretary.

The Naval Surgeons appeared to present little difficulty to the Royal Commission, but very definite recommendations were advanced concerning their qualifications, rates of pay, numbers borne in ships and scheme of retirement. Every Surgeon was deemed "to have an unqualified right to retire on half pay of 15s. per diem after thirty

[1] Formerly Carpenter.

years service on full pay, including not more than three years as Hospital Mate or Assistant Surgeon. Recommendations were also submitted that all medicines, etc., for the use of the sick should be supplied from Government funds.

The question of the Royal Marines was also gone into thoroughly and a somewhat protracted debate took place over the matter of the employment of field and senior officers of that Corps. Many points were raised regarding the disabilities under which they suffered, when compared with the Army; some of these would appear to exist to this day. The Royal Marine[1] officer of to-day, without losing any of those military qualities which have ensured the success of his Corps on so many occasions when serving ashore, is now trained to perform naval duties,—such as Officer-of-the-Watch in harbour—to a greater extent than he used to be under a system where he was regarded as being more of a soldier than a sailor.

Only nine steamships appear in the Navy List of 1831, and no reference is made to any personnel for the technical duties in connection with their engines and boilers. When Engineers first came into being in the Navy they were very much "nobody's children," and in point of fact were really dockyard ratings. They were not even given the status and uniform of a Warrant Officer until 1837. At one period they wore engines embossed on their buttons, in the same way that officers of the Navigating Branch had theirs charged with the Admiralty anchor, while Surgeons had their buttons embossed with the staff of Aesculapius surmounting an anchor. An indication of the primitive nature of warships' machinery in the early days of steam is to be found in a contemporary regulation laying down that "on no account are ratings to be allowed to place their clothes in the boiler when it is under steam." Such a practice may be attributed to the fact that 7 lbs. per square inch was the full steam pressure. The method advocated for clearing a choked flue was, to fire a musket up the funnel!

Engineer officers, were for many years, trained at the Royal Naval Engineering College at Keyham with a proportion of direct entries open to engineering apprentices. This system just overlapped the Osborne scheme which superseded it and the lists of engineer officers chosen from the latter were added to by selected promotion, to Mate (E), from the lower deck.

To-day, the Engineer officers of the Navy are recruited from Naval Cadets who specialise in this branch as Midshipmen.

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[1] The Royal Marine Artillery and Royal Marine Light Infantry were amalgamated as the Royal Marines in 1923

SHIPS' COMPANIES

Up to the end of the Napoleonic Wars it had been customary to bring the crews of naval ships up to strength by the impressment of seamen. This was originally authorised by Edward III in 1355, and regulated by a Statute of 1378. The latter was declared illegal in 1641, but again regulated by a William IV Statute of 1835. In 1852-53 the continuous service system was introduced, and training ships for boys were established to keep up the supply of a certain number of seamen for the fleet in peace time. This was a notable event as it marked the first establishment of a standing Navy, so far as personnel was concerned. When war broke out with Russia in 1854, however, the authorities were hard put to it to man the large fleet required in the Baltic. Nevertheless, impressment was not resorted to, even though it was still legal. With the peace of 1856 there was a popular clamour for drastic reductions, and even continuous service men to the number of some thousands were discharged, with the result that when another scare came in 1858 recourse was had to exceptional means. A bounty of £10 was given to able seamen, and £6 to ordinary seamen of the Merchant Service who volunteered to serve. This opened the way to much fraud, men enlisting at one port and receiving the bounty, deserting at the first opportunity, re-enlisting under new names and receiving a second bounty, and eventually deserting altogether to enjoy their booty. Moreover, the seamen in the fleet had to be given the bounty in order to keep them in a good humour. It was a striking object lesson in the danger of having no proper reserves for the Navy.

For many years there were three harbour training ships for newly entered boys in the Royal Navy—the "Ganges" at Harwich, the "St. Vincent" at Portsmouth, and the "Impregnable" at Devonport. The first name is still retained for what is now a shore establishment at Shotley, the second for that at Gosport; Devonport no longer trains boys.

The old sailing Navy died hard, and there are many officers serving to-day who have heard the pipe "down funnel and up screw." Training in sail was continued for many years in the old training squadron and the brigs. The training squadron was the first to be abolished, but the brigs lasted until the beginning of the XXth Century, when they too were scrapped.

NAVAL RESERVES

The Merchant Service is, traditionally, the Royal Navy's principal Reserve, both for men and ships, but with the gradual evolution of

the fighting ship and the huge demand for sea transport which a modern war entails, the material reserves from that source seem likely to diminish, just when a reserve of trained personnel has become increasingly important.

Attempts were made in 1696 and 1798 to create a force of reservists, and those raised under the later scheme were known as "Sea Fencibles." This was not a permanent force, although officered by the Navy, but one raised and disbanded as occasion demanded; incidentally it was used by many of its members as a means of escaping from impressment. It was finally disbanded at the close of the Napoleonic War. In 1853 a corps of "Naval Coast Volunteers" was raised and it survived without incident for twenty years. The effort though well meant was feeble and hedged with stupid restrictions, one of which limited the radius of action of its members to fifty leagues from the coast in peace and a hundred leagues in war. In 1858 a Special Commission reported on naval matters, with the result that the Royal Naval Volunteers Act was passed in the following year, and this was the first attempt to form a reserve of bona fide seamen, the two previous forces having been recruited from coast inhabitants who were not sailors by profession. This Committee also advocated the use of training ships for recruiting seamen for the R.N.R. In 1864, when the old Red, White and Blue Squadrons were abolished in the fleet, and the White Ensign became universal for all ships of the Royal Navy, officers of the Royal Naval Reserve were permitted to fly the Blue Ensign subject to certain restrictions and regulations which still exist.

The Russian War Scare of 1885 gave a big impetus to the R.N.R. and various reforms were then introduced. During the 'nineties technical courses were instituted for R.N.R. Officers, who readily responded to the facilities afforded. A scheme was also put on foot for making the R.N.R. service more attractive to the Engineers.

Admiral Tryon was one of the chief supporters of a R.N.R. uniform and his scheme bore good fruit in increasing the number of applications to enter.

In 1895 the first batch of R.N.R. officers, nick-named the "Hungry Hundred," transferred to the Royal Navy; these were followed by fifty more, known as the "Hungry Half Hundred." In 1904 the R.N.R. came in for its share of reforms and some of its grievances were removed. The rank of Commander R.N.R. was instituted, and in 1908, the Reserve Decoration was established for Officers, and the Naval Long Service Medal was granted to R.N.R. ratings.

Six years later the Trawler Section of the R.N.R. was founded and it was largely from this source that the crews of our wonderful mine sweepers were recruited.

Another small reserve force was the Royal Naval Artillery Volunteers raised by Act of Parliament in 1873. The regulations governing this body followed more or less along the lines of the "Sea Fencibles" of 1798, except that no restriction was imposed as to residence, and the officers were also volunteers and were practically selected by the Corps. In 1892 a Committee, of which Vice-Admiral Sir George Tryon, K.C.B., was chairman, advocated the abolition of this force, and in due course this was done.

In 1903 another Committee was appointed and it was the recommendations of this body which really established the Royal Naval Volunteer Reserve in the form in which it is known to-day.

From 1914 onwards the history of the R.N.R. and R.N.V.R. is the history of the war at sea, and needs no recapitulation; suffice it to remark that the old saying again proved true: "big ships may fight the battles, but the small ships clear the way."

THE ROYAL NAVAL AIR SERVICE

In 1912 flying in the Navy had its first headquarters at Eastchurch, and the officers and men engaged there were borne on the books of H.M.S. "Actaeon." The official name of this personnel was "Royal Flying Corps—Naval Wing," but this soon dropped out and became "The Royal Naval Air Service." The late Air Commodore (then Commander) C. R. Samson was the first Officer in Command of the Naval Flying School, and Captain Murray Sueter was the Director of the Air Department.

Naval flying was not confined to seaplanes, and good work was done during the war in kite balloons, in small airships—"Blimps"—and in land service aeroplanes. In the Dunkerque sector of the line, in France, and down on the Somme the R.N.A.S. made its presence very much felt; and so matters continued until April, 1918, when the R.N.A.S. and R.F.C. were united into "The Royal Air Force."

In July, 1918, the Air Ministry prescribed the terms to be used by the new combined Service; the new word "airman," came into being as the result, and the striking of "bells" for timekeeping in naval fashion, and the retention of "port" and "starboard" are about the only relics of naval customs and nomenclature which remain from the R.N.A.S.

The fleet still has its "Fleet Air Arm," a force in which a large proportion of the Pilots and all Observers are naval officers. Aircraft

carriers are highly important units of the fleet, even if their vulnerability and employment are still subjects under discussion by the authorities. "There is nothing new under the sun"; so the wheel again turns full circle and the question of the weather gauge once more looms large in naval tactics.

Before closing this very brief review of naval personnel during the past century, tribute must be paid to the Royal Naval Nursing Service, and to that large army of women who served under the White Ensign during the war in the Women's Royal Naval Service, and who will always be remembered affectionately as the "Wrens."

UNIFORM

Uniform for officers had been officially established in 1748. In 1833 William IV changed the facings of the coats from white to red, and distinctive arm stripes were introduced for flag officers. Ten years later white facings were re-introduced, and at the same time the coats of executive officers were made double-breasted, other branches being single-breasted. Crown and anchor buttons were standardised for all branches except Engineers, and the second epaulette was introduced for Lieutenants. The gold crown on officers' caps was authorised by Queen Victoria in 1846. Many slight changes in uniform took place after the Russian war; distinctive arm stripes were extended to Captains—three rows; Commanders—two rows; and Lieutenants—one row; while the existing black mohair band replaced the gold lace on officers' caps. At this time, 1856, a plain gold peak was introduced for the caps of Commanders and higher ranks, and the "curl" on the sleeve for officers of the military branch. In those days cocked hats were more often worn on board than caps, and the latter were not permitted to be worn on shore; it is within living memory that certain officers continued to wear top hats when in uniform, and saluted by raising the hat; a custom retained by very elderly officers even as late as 1918. The personal salute with the hand was copied from the Army and introduced into the Navy in 1890. In 1914 we again copied the Army and abolished the left-hand salute. Further changes in uniform included the present-day peak of oak leaves, which was introduced in 1860 instead of the plain gold band for senior executive officers' caps. Three years later an additional gold stripe was given to Captains and junior ranks, while the distinctive lace on sleeves for officers below flag rank became the same as it is to-day, with the exception that the half stripe for Lieutenants over eight years seniority was not introduced till 1877. It was in 1863, too, that the civil branches assumed their distinctive

colours between the rows of gold lace. White uniform for officers on foreign stations was introduced in 1885, and the double-breasted coat for all branches in 1891. In that same year the three buttons between the stripes of commissioned officers were abolished. During the Great War the oak leaf peak was extended to the caps of all officers of the equivalent rank of Commander and above, and the curl in the upper row of lace to all branches, the distinctive cloth between the stripes being retained.

DISCIPLINE

The first edition of the King's Regulations and Admiralty Instructions was printed two hundred years ago. Certain modifications, such as responsibility for fresh water being transferred from the Navigating Officer to the Engineer's Department, have, of course, been necessary to bring the present edition in line with modern conditions of life generally; but the age of swift invention has produced no radical changes either in the wording or in the Regulations themselves: a fact which reflects great credit on the original compilers, and goes to show how thoroughly conservative is the naval Service.

The last yard-arm execution took place at Talienwan Bay in 1860, the culprit being a Royal Marine who was found guilty of attempting to murder his Captain. The fact that the Second Chinese War was in progress may have had something to do with the severity of the sentence. Flogging at the gangway was still a summary punishment a hundred years ago, but the maximum number of lashes had been limited to forty-eight in 1830. In 1859 orders were issued that no 1st class seaman was to be flogged without trial. Corporal punishment was further restricted in 1871, and practically abolished in 1879. The last case in the Service was in 1882. Captains of ships were given power to award summary imprisonment in 1847, about which date cells on board ship were officially recognised. Minor punishments were regulated and numbered in 1853.

Shortly after the accession of Queen Victoria the practice was discontinued of allowing ships in their home ports to be filled with women—the so-called wives of the sailors—and greater facilities were afforded for shore leave. The matter came under the immediate notice of the Queen when she was on board a certain ship, and the difficulty of satisfactorily explaining the superabundance of women between decks caused no small concern to the officers of the ship. Investigation finally led to the practice being officially stopped. Prior to 1837 certain women had been allowed in ships and they were

definitely borne on the strength for rations and had certain duties allotted to them, one of which was the care of the sick. Subsequent to this date certain officers on foreign stations continued to condone for many years the practice of taking women to sea, but it must, in fairness, be stated that the local station orders permitted this to be done in certain cases.

Space does not permit of a comprehensive review of the gradual alteration of the character of naval discipline and in the relations of the officers to their men, but the change in the type of man during the last hundred years has been very marked. The seaman of to-day is better fed and cared for than his contemporary in any other walk of life, except, perhaps, in the sister Services. He is a very highly specialised individual, with a natural pride in his own importance, and if he has lost something of the recklessness of his predecessor of the old sailing Navy, he is most certainly a man of far higher education and intelligence, while his conduct both ashore and afloat makes him a worthy representative of his native land wherever his duties may take him.

VICTUALLING

With regard to victualling, the following are the more noteworthy changes in the past hundred years. The issue of rum was reduced from a half pint to one gill in 1824, when tea was first issued. The practice of serving out grog before dinner and also in the evening was abolished, the mid-day issue only being retained. Two years later the introduction of the imperial measure in lieu of the old wine measure increased the existing ration by one-fifth and evening issues of spirits recommenced and remained for twenty-four years until frequent representation by commanding officers caused the ration to be halved when evening issues finally ceased. Officers and men were granted an increase of pay, proportionate to the savings' price of the rum, but Midshipmen and boys were deemed to be not entitled except under special circumstances. At this time, too, the question of the solid food ration was also considered, and the salt meat and sugar issues were increased, while mustard and pepper replaced the age-old vinegar and oatmeal.

In 1867 tinned mutton was introduced as a Service ration. Being a novelty it was probably regarded with some suspicion by the conservative sailor, who nick-named it "Fanny Adams," implying that the perpetrator of a revolting child murder in that year, had found a gruesome means of disposing of his victim. Tinned mutton is no

longer issued, but the name is still applied to tinned beef. The pickling of salt beef or "salt junk" was discontinued in 1904, and that of salt pork some twenty years later, but existing stocks were issued on demand until exhausted. Salt pork and salt beef of over a hundred years of age was not only fit to eat, but quite palatable if well cooked. Early in this century, marmalade, jam, and tinned tobacco were introduced into the Service; the old stagers regarding these innovations with a peculiar horror. The jam was made by Messrs. Tickler & Sons, and the term "Tickler" came to be used for the fine cut tinned tobacco, also as an expression of ridicule for the short-service seamen of that period.

Up to this time seamen's mess traps[1] were of the very scantiest, but with advancement in hygiene and general improvement in the standard of living their quality has been greatly improved and the quantities augmented until they are now, it is to be hoped, reasonably satisfactory. From time immemorial the men's messes had to be permitted to deal with bumboats for the purchase of provisions, etc., and at one time the bumboat men used to supply private crockery to the messes in order to keep their custom; samples of this may yet be found in the vicinity of most Royal dockyards, and at Malta in particular there are numerous pieces still to be obtained.

Towards the end of the XIXth Century the Admiralty permitted certain persons and firms of repute to establish dry canteens on board, and these traders were charged a rental for their tenancy while their prices and methods of business were subject to the supervision and jurisdiction of both the ship's officers and the canteen committees, to which the men appointed their own nominees. At the commencement of the Great War the question arose not only of the status of civilians serving as Canteen staffs in the fleet but also of the difficulty of the canteen service being managed by numerous different firms. This caused the existing tenants to have their contracts cancelled and the present canteen service was instituted. This has grown into a vast business concern which ministers to the needs of all three Services and in which the profits accrue directly to the men themselves The Royal Naval Benevolent Trust came into being at about this period and Admiralty approval was obtained for the institution of the Naval Welfare Committee; the former was the amalgamation of numerous funds already allocated for pecuniarily assisting men from the lower deck and their dependents, while the latter is a committee consisting of ratings who are allowed to approach the Admiralty on all matters concerning the welfare of the lower deck, excepting those involving questions of discipline and policy.

[1] Cutlery, china, etc.

MESSING

Until very recent times, in fact until General Messing was instituted about ten years ago, the rations in all ships used to be "dished up" by a hand detailed in rotation from each mess and known as the "cook of the mess"; the resulting effort was then tallied and handed over to the ship's cook and reclaimed just before dinner. The "cook of the mess" was often a complete amateur, and usually the ship's cook was very little better. Some men became excellent cooks, and many are still to be found in smaller craft where the one official cook allowed is often only too glad to have assistance.

The mess decks of the ships and the customs existing therein up to the early years of the present century remained much as they had been during the Napoleonic wars, and in many ships men were still allowed to form their own messes and change from one to another as they desired, provided notice was given in on a Saturday: the day on which changes were permitted to take place. About 1910, 2nd class petty officers ceased to be rated, and leading seamen were placed in charge of all seamen's messes. There have been many improvements of late years in messing arrangements, especially those for petty officer ratings; but the "broadside mess" with its semi-portable table and long wooden bench each side is still there.

SOME NOTABLE PERSONALITIES

The Navy has produced many quaint characters, and innumerable examples could be cited of both officers and men who have left a reputation for originality if not eccentricity. It was the Captain of a frigate in 1860 who had his poultry painted a uniform colour and ordered them to be fallen in for his inspection. An officer with more regard for precision than music is reputed to have had his band drilled by a gunner's mate in the hope that the violinists would learn to slope their bows together and in time. Another Captain,—one of the kindest-hearted men of his day in other respects—had a peculiar aversion to boys who came from Brighton and was known to have sentenced a boy who came before him as a "requestman" to twelve cuts with the cane for no other reason than that he was under the firm impression that the youth hailed from that place. This same officer added to the humour of the ship by sending for his steward—"a most capital fellah"—in all moments of doubt or difficulty; but even the steward could not help him out of his predicament when he put to sea and found that he had lost his sailing orders without having perused them. One commanding officer got rid of so many Commanders and other officers, and was responsible for such a crop

of loggings and courts martial that a special silver medal was privately struck to which any officer was entitled who survived six months without having been logged or tried by court martial; one side of the medal bore the representation of a fruit tree in allusion to the Captain's name, and underneath it were depicted the six survivors of the commission, with numerous officers disappearing into the dim distance. To-day this medal is a much prized rarity, but it is not likely to be found in any numismatist's catalogue.

In a different category are such names as Sir Edward Codrington, Sir William Parker, Sir Frederick Richards, Lord Fisher, Sir Arthur Knyvet Wilson, Lord Charles Beresford, and Sir George Callaghan, whose records are milestones in a century of naval development. Their achievements need no recital here, suffice it to say that the present day Service, not only technically, but also as far as the welfare of the men is concerned, owes much of its well-being and efficiency to their persistent efforts, and the fact that they held by the old saying "there is nothing the Navy cannot do."

ACTIVE SERVICE

At the beginning of the hundred years under review, the Navy had been actively engaged for years in stopping the transportation of slaves, and in 1833 the bill for the total abolition of slavery was passed; but this by no means ended that side of naval duties. Even to-day, this, together with the suppression of gun-running, remains an important part of the work of H.M. ships in the Persian Gulf. It is a work which has always called for much initiative and resource on the part of the officers and men engaged in it, especially in the days of small sailing ships and no wireless. The latter may have made matters easier in some respects, but it is open to doubt whether it is not a mixed blessing, at any rate for the man on the spot.

During the Crimean War, the Navy played its part both on sea and on land where parties from the fleet manned heavy batteries and acted in concert with the Army. It is alleged that a certain naval mess while serving ashore in the Crimea built themselves a hut from discarded beer bottles, and that the Russians for many years showed this relic to visitors to demonstrate what manner of opponents they had to contend against.

In the Indian Mutiny, Sir William Peel's naval brigade, which was landed from the "Pearl" and "Shannon," did good work with their ships' guns and established a very strong liaison with the Highland Regiments then serving in India. Strangely enough this friendship was resumed during the Boer War when the naval field

guns met the Cameron Highlanders and were entertained with true highland hospitality. The guests having seriously depleted their hosts' stock of eatables and liquor left the soldiers in the small hours of the morning, and turned their attention to their own supplies which were secreted in their limbers; the Highlanders saw the joke, but to prevent a similar occurrence promptly made all commissioned naval officers for all time honorary members of their mess.

Space will not permit reference to the many and varied activities of the Navy since 1857 up to the time of the Great War, but it must suffice to say that it took part in hostilities in China, New Zealand, South Africa and the Malay Seas, while many places all over the world which needed the aid of a benevolent policeman had reason to bless the prompt arrival of a British man-o'-war. Only within the past year one of our cruisers was called upon to evacuate women and children during a disturbance in Brazil; the same ship was instrumental in suppressing a rising in Dominica which had got beyond the control of the local police. Another cruiser rendered invaluable assistance after a hurricane had devastated Santo Domingo. Life and property in Chinese waters, especially on the Yangtse river have been safeguarded to a great extent during the recent turbulent years by the presence of British warships. Boats from yet another of our cruisers rescued the crew of a German merchant ship which had gone on a reef.[1] Finally the New Zealand division of the Royal Navy was first on the scene to help the sufferers in the earthquake which destroyed Napier at the beginning of this year.

It is evident, therefore, that the Navy is ever on active service—not only fighting the King's enemies when required to do so, but keeping the peace, and helping those in danger or distress the world over and without discrimination of race or nationality.

II. SHIPS AND EQUIPMENT

By CAPTAIN E. W. SWAN, O.B.E., V.D., R.N.V.R.

IN a review of the changes in the ships of the Royal Navy and their equipment during the past hundred years, it will not do to disregard entirely developments in foreign navies during the same period, because no matter how superior our fleet may have been in numbers and efficiency, we cannot claim that we were always in the

[1] Statement of the First Lord of the Admiralty accompanying the Naval Estimates for 1931.

van when it came to the adoption of new types and new weapons. For instance, in the case of ship construction, we were slow to accept the advantages of iron, and it was the French "Gloire," regarded very generally in England as a rash and costly experiment which led in 1859 to the design of our "Warrior," the first of all iron-armoured British men-of-war. Again, the Italian "Duilio" of 1876 led to the laying down of the "Inflexible"; while even the much vaunted and much criticised design of the "Dreadnought," laid down in 1905, had to a large extent been forecasted by Colonel Cuniberti, Chief Constructor of the Royal Italian Navy, in an article published in Jane's "Fighting Ships" of 1903. We were many years behind the United States, France, and even Spain in taking up the submarine. In the development of naval weapons we can also trace the influence of foreign example. It was the use of shell, as distinct from solid shot, by the French at the time of the Crimea which led to their adoption by our Navy; the interrupted breech screw, and the de Bange obturator were both obtained from the French. The torpedo in its modern form was the invention of an Austrian naval officer, and was first tried in that navy in 1867. It was not until three years later that the British Admiralty experimented with this weapon. It must, however, remain a matter for argument and speculation whether we gained, by allowing foreign Powers to experiment with new designs and inventions before adopting and improving on them ourselves, or lost by the exceptional efforts which we subsequently had to make in order to catch up.

The year 1831 found the Navy at a period of stagnation. With the exception of the bombardment of Algiers in 1816 and the battle of Navarino in 1827, it had seen little active service since Trafalgar, twenty-six years previously. The effect of this lack of war experience was that there seemed little on which to base new designs. Nevertheless, developments in machinery and scientific progress generally were soon to make their influence felt, and the long reign of Queen Victoria saw a complete revolution in naval construction and armaments.

THE LAST SAILING SHIPS OF THE LINE

Rear-Admiral Sir Thomas Masterman Hardy, Bart., K.C.B., had been appointed First Lord of the Admiralty in the previous year, and the new Board at once set about making the ships of the Royal Navy more useful fighting units. At this time the fleet included a few powerful 120 and 80-gun line-of-battle ships, a large number of 74 and 60-gun ships, a great many 46-gun frigates carrying 18-pounders, other frigates—known as "donkeys"—carrying 26 guns, and a

number of sloops carrying 18 or 16 guns. The latter were much over-masted, and, on account of the number of them which met with disaster, they earned the soubriquet of "coffins."

The principal alterations which this Board effected were the cutting down of the 74's into 50-gun frigates carrying 32-pounders, and turning the 46-gun frigates into powerful corvettes. For many years the chief improvements in naval architecture had been copied from the best American or French prizes, and even as late as 1845, when the "Sans Pareil" was laid down at Devonport, she was designed on the lines of a French ship of the same name, captured in 1794. She was, however, lengthened and converted while on the stocks, and launched in 1851 as an 80-gun screw ship.

The adoption of steam machinery was strenuously resisted by senior officers who had been bred in the school of masts and sails. As recently as 1828 the Board of Admiralty, in response to a request by the Colonial Office for a steamer to convey mails between Malta and the Ionian Isles, expressed their inability to assist, adding that "... they felt it their bounden duty to discourage to the utmost of their ability the employment of steam vessels, as they considered that the introduction of steam was calculated to strike a fatal blow to the naval supremacy of the Empire." Sir Thomas Hardy, having taken part in most of the important naval actions of his time, was strongly in favour of sailing line-of-battle ships of 120 and 90 guns; nevertheless, he foresaw that science must inevitably alter the whole character of the Navy, and, shortly before his death, he said "... depend upon it, steam and gunnery are in their infancy."

The century under review commences so short a time after the introduction of steam into the Navy that it may perhaps be permissible to go back ten years in order to make the subject clear and complete. The first steam vessel used in the Navy was the paddle-wheel tug "Monkey," purchased in 1821, followed shortly afterwards by the "Comet," launched at Deptford on 23rd May, 1822. Both vessels had engines made by Boulton & Watt, and were almost identical. All the early steam vessels were paddle, and by 1831 twenty-three had been built with a nominal horse power (N.H.P.) of 200 or under, and only one vessel, the "Sprightly," with engines exceeding that figure. In 1831 seven further vessels were built, but their N.H.P. did not exceed 260. In the twenty years, 1830-1850, some hundred and twenty steam vessels of various sizes were built, the greater proportion being under 500, and only four exceeding 1,000 N.H.P.

At first steam was only used for such craft as despatch vessels or tugs, but in spite of much opposition it was gradually realised that

it had possibilities for vessels of war. The first steam fighting ship was H.M.S. "Dee," which was launched at Woolwich in 1832. She was a frigate of 704 tons, fitted with Maudsley engines of 200 N.H.P., and carried an armament of four guns—two 32-pdr. 63-cwt., and two 32-pdr. 25½-cwt. She was followed in the same year by the "Rhadamanthus"[1] and "Salamander." These vessels were built of wood, as were all the early steamships prior to 1840. All three ships proved useful; the "Dee" and "Rhadamanthus" were sent, almost as soon as they were completed, as part of a squadron to blockade the Dutch ports, and the "Salamander" was employed in operations against the Carlists in North Spain in 1837, and in the Rangoon River in 1852. But steam was still regarded as being largely experimental, and sailing ships of war of all sizes continued to be built.

The year 1832 saw many other changes in naval policy and administration, amongst them being the removal of the restriction on the dimensions and armaments of men-of-war. In this year, too, Captain William Symonds, a distinguished naval officer, was appointed to the post of Surveyor to the Navy, a position he held for fifteen years, during which time he effected great improvements in the design of ships.

Symonds had been made a post-Captain in 1827, and in the previous year had been allowed to design the "Columbine," corvette, afterwards said to have been the fastest and most graceful ship ever built for the Royal Navy. Besides introducing the elliptical stern his designs were chiefly notable for the V-section of the hull, as distinct from the full-bottomed or U-section, which had hitherto been regarded as a sine-qua-non for stability and strength. During his term of office, over a hundred and sixty vessels of all classes were built to his designs, while many others, laid down to those designs, were later converted to screw propulsion or altered in some other way. His most famous ship, perhaps, was the "Queen," a vessel of 3,104 tons, launched at Portsmouth on 15th May, 1839. Her length was 247 ft. and beam 60 ft. She carried an armament of a hundred 32-pounders and ten 68-pounders, having a total weight of 311 tons, and throwing a broadside of 1,840 lbs. of shot. She cost £114,492, and is said to have been the finest ship of her type ever built, and undoubtedly marked the zenith of construction of wooden sailing men-of-war.[2]

[1] Model in the Crypt of the Royal United Service Museum.

[2] A very fine model of a similar ship, the "Royal Albert," is to be seen in the Royal United Service Museum; but this ship, unlike the "Queen," was lengthened while still on the stocks and converted to a screw ship of the line. She was launched by Queen Victoria in 1854.

Two years earlier Symonds had built his first two-decker line-of-battle ship, the "Vanguard" 80, this ship being remarkable for having a beam of 57 ft., the greatest of any ship built in England up to that time. Her unusual size permitted a considerable improvement to be made in the messing accommodation, etc., besides giving increased space for stowing provisions and water—a matter of no little importance in those days. The "Vanguard" was also found to have greatly superior sailing qualities to the "Rodney" 92, built in 1833 by Sir R. Seppings. One of Symonds' earliest ships, the "Vernon" 50, built in 1832, was regarded as the ideal sailing cruiser; she was described by Admiral Sir Charles Napier as "the most magnificent frigate ever built by any nation."

STEAM AND IRON

But the days of these beautiful old sailing men-of-war were numbered. In April, 1837, a department of steam machinery was formed, and iron hulls began to make their appearance in the Navy. The first iron steam vessel in the Service was the "Dover," packet, laid down in 1839, and the first iron man-of-war was the "Birkenhead," built in 1845; it will be recalled that she came to a tragic end seven years later. Symonds was not responsible for her design, and after 1841 his influence on new construction weakened. In view of his success with sailing ships built of wood, it is not surprising that he was opposed to the use of iron for hulls and of steam for propulsion. On his retirement in 1847 there was a tendency to revert to the old-fashioned design of full-bottomed hull, but this was checked by the pressure which the "new" ideas of construction created.

With the advent of steam there arose a controversy on the respective merits of the screw propeller and paddle wheels. The former, largely owing to prejudice and vested interests, at first found little favour. In 1840, however, a series of comparative trials were commenced. The first of these were carried out by the "Archimedes" (screw), and the "Widgeon" (paddle), but the ships were unequally matched, and the results therefore inconclusive. It was not until five years later that the screw secured the verdict after a dramatic contest. This took the form of a tug-of-war between the screw ship "Rattler" and the paddle-wheeler "Alecto." Lashed stern to stern, the vessels steamed in opposite directions, until the "Rattler" slowly but surely pulled over the "Alecto."

The first screw vessel in the Royal Navy was the "Dwarf," originally the "Mermaid," which was built by Messrs. C. & J. Rennie at Blackwall in 1840, and, by the advice of Sir George Cockburn,

purchased by the Admiralty in 1843, for £5,350, after fulfilling the condition that she should maintain a mean speed of 12 miles per hour on six runs.[1]

The adoption of the screw propeller, although it simplified the problems of warship design in many respects, had a curiously reactionary effect in two ways—it facilitated the retention of masts and sails (steam being still regarded as merely an auxiliary), and it enabled the broadside disposition of the armament to be retained, where paddle wheels had compelled the adoption of the middle-line pivot gun, forerunner of the modern disposition of warship armaments.

The only noteworthy features of the "fifties" to which we need refer were the introduction of armour protection and the appearance of the first rifled field gun, which was shortly to create the long controversy as to the respective merits of rifled and smooth-bore guns for naval purposes. The inability of unarmoured ships to stand up to projectiles loaded with explosives was shown during the Crimean War, and the French having built ships with armour protection, the Admiralty, much against public opinion, decided in 1859 to construct the "Warrior," a ship with a hull built entirely of iron and protected by 4½-inch armour plating with an 18-inch wood backing. This was the first all-iron British man-of-war. She was completed in 1861 at a total cost of £356,693. Her armament consisted of twenty-eight 7-inch 6½ ton, and four 8-inch 9-ton guns, all muzzle loading, rifled pieces, but they were mounted so that they could only be fired on the broadside. These four heavy guns marked an appreciable advance on the 7-ton weapons which the bulk of naval opinion still regarded as the largest which could safely be carried and used on board ship.

The "Warrior" was followed by the "Black Prince," "Defence," and "Resistance." The first-named was a sister ship, but the two latter were only 6,150 instead of 9,210 tons displacement, and their engines were only 2,540 against 5,770 H.P., while their armament was reduced to fourteen 7-inch 6½-ton, and two 8-inch 9-ton M.L.R. guns. Then came the "Achilles," an improved "Warrior," completed in 1864 at a cost of £444,546. She was notable as having a complete armour belt around the water line, while her speed was slightly higher.

In 1862 Sir E. J. Reed was appointed Chief Constructor, and to him belongs the credit of having broken away from the old idea of a complete broadside fire, i.e. guns ranged the full length of the ship on both sides. All the earliest ironclads had followed the practice prevailing in wooden ships of having square gun ports at intervals

[1] A Model of this Vessel may be seen in the Crypt of the R.U.S. Museum.

along the sides, necessitating, in the case of "armoured" ships, large holes being cut in the protective plates. Reed believed in fewer but heavier guns, arranged in a central battery, where they could be the more easily protected.

His first large ship was the "Bellerophon," completed in 1866, carrying an armament of ten 12-ton and two 6½-ton M.L.R. guns, the central battery being protected by 8-inch plating at the water-line. This ship is also interesting as being the first to have bracket-frame construction and a cellular double-bottom. The "Hercules" was an improved ship of the type, and was the first to have recessed gun-ports, which had been tried experimentally in the "Pallas."

In the early 'sixties' a number of wooden ships—the "Caledonia," "Royal Oak," "Ocean," etc.—were cut down and lengthened into ironclad frigates, and given protection somewhat similar to the "Warrior": usually 4½ inches of iron plating, except the "Royal Alfred," which was given 6 inches. This compromise in the efforts to modernize the fleet was not unnatural in view of the fact that the capital value of the wooden ships of the Navy in 1863 was about £20,000,000. The last wooden frigates built for the Royal Navy—the "Mersey" and "Orlando" of forty guns and 100 H.P., and the "Ariadne" and "Galatea" of twenty-six guns and 800 H.P.,—were launched in the years 1859-1862. The engines of the latter were more powerful than any that had hitherto been fitted in wooden ships, and it was soon evident that nothing except an iron hull would stand the strain of increasingly heavy machinery. In view of the progress which had been made with steam and in iron construction by this time, it is not surprising that wooden ships soon fell into disuse; yet they re-appeared as "composite" ships, which were a very prominent feature during the 'eighties,' particularly for vessels built to serve on foreign stations.

The "Warrior" design was further developed in the "Minotaur," completed in 1867, and the "Northumberland" and "Agincourt," completed in 1868. These ships carried heavier armament than the "Warrior"; the "Minotaur" and "Agincourt" having seventeen 9-inch 12-ton, and the "Northumberland" seven 9-inch 12-ton and twenty 8-inch 9-ton M.L.R. guns. They are celebrated as having been the largest masted ironclads, and each, originally, had five iron masts, the three foremasts being square-rigged and the two after-masts having fore and aft sails only. They were found to be extremely difficult to handle under sail, and the design was not repeated.[1]

[1] The "Northumberland's" rig was reduced to three masts in 1879, but the other two retained their original masts until 1890.

A notable feature in warship construction, which came in with early iron men-of-war, was the ram. The battle of Lissa, in 1866, showed the potentialities of this weapon, and almost all types of iron ships for many years were given rams. The "Hercules," built in 1868, was the first British ship to be given a definite sharp ram, although the "Minotaur" had a projecting form of bow which almost resembled a ram. The last ships to be built with rams were the "Lord Nelson" and "Agincourt," completed in 1908 and 1907 respectively.

As we have seen, the broadside arrangement of the armament was already giving way to the central battery, but Captain Cowper Coles, R.N., amongst others, had for years been advocating the system of mounting heavy guns in turrets, before 1869, when the "Monarch," the first British ship with her armament so mounted, was completed. The "Monarch" had two turrets amidships, each with a pair of 12-inch 25-ton guns. Before the ship was launched, Captain Coles severely criticised her, and his views were supported by a vehement Press campaign. As a result, in 1867 he was allowed by the Admiralty to design a ship himself, and produced the ill-fated "Captain."[1] This ship had only half the freeboard of the "Monarch" and was also fully rigged. She capsized under sail in a storm in the Bay of Biscay in September, 1870.

THE MASTLESS TURRET SHIP

Masts and yards in large ironclads could not have survived much longer, but the loss of the "Captain" definitely sealed their fate. The "Devastation" had been designed before that disaster, but she was not completed until 1873. As a type she is of particular interest, for not only was she the first 'mastless' turret ship in the Navy, but in her general design she really embodied the principles of the "Dreadnought" class of nearly forty years later. With her two centre-line turrets, each mounting a pair of the latest 12-inch 35-ton M.L.R. guns, and only six very light Q.F. guns as a secondary armament, she was essentially what afterwards became known as the "all big gun" ship. The turret armour was 12-14 inches, and the side armour 10-12 inches with 16-18 inches backing. Her engines were 6,650 H.P., and she was one of the first ships in the Navy to have twin screws. She presented a drastic change from the old conception of a ship of the line, and a final break from the days of the broadside sailing line-of-battle ship. At the time she seems to have aroused as much fierce criticism and opposition as the "Dreadnought"

[1] A model of the "Captain" may be seen in the Crypt of the Royal United Service Museum.

did nearly half a century later. One curious failure to profit by sea experience is to be seen in this ship and numerous successors of a similar type. In the old days of the three-deckers it was often impossible to use a large proportion of the guns owing to inability to open the lower gunports. In ships designed by Sir William Symonds the difficulty had been largely overcome, and later ships, up to the "Monarch," had the guns mounted as high above the water as possible. These new mastless ironclads, however, had such a low freeboard that they were very "wet" in any seaway. This defect was not really eliminated until Sir William White produced the "Royal Sovereigns" in 1895.

THE TORPEDO

With the arrival on the scenes of the forerunner of the battleship as we know it to-day, there also appeared a new adversary in the form of the torpedo. The torpedo in its modern form was the invention of Captain Luppis, an Austrian naval officer, who produced his first example in 1867. But this lacked effective motive power, so he sought the assistance of Mr. Robert Whitehead, manager of an engineering works at Fiume. The latter, after considerable study of the problem, devised the system of propulsion by compressed air.

In 1869, a British Naval Committee visited Fiume, and as a result two torpedoes were sent to England towards the end of 1870. Following experiments with these, the use of torpedoes was gradually extended until they became regular features in many classes of men-of-war. They also brought about a special type of vessel, the torpedo-boat, which, in some quarters, was hailed as having spelt the doom of the battleship. But before long the limitations of these small craft became apparent, and, as for every other form of attack, effective means of defence were found.

The first British torpedo-boat was the "Lightning"—afterwards known as "No. 1"—built in 1877; but it was not until 1885 that torpedo-boats were taken up seriously for our Navy. In that year fifty-four were put in hand, and by the end of 1895 Britain had no less than eighty-two of them, exclusive of smaller types less than 100 feet long.

In 1885 an attempt was made to provide an antidote to the torpedo-boat in the shape of torpedo-gunboats of the "Rattlesnake" class; but these proved to be too big and too slow for the work. The true answer was found in the destroyer, the first of which was the "Havock," launched by Yarrow in 1893. From a craft of 240 tons with a speed of 26.7 knots and an armament of one 12-pounder and five 6-pounder guns, the destroyer has become a ship of 1,330 tons, with a speed of

36 knots and carrying four 4.7 inch and seven smaller guns; while her torpedo armament has increased from two single 18-inch tubes to two quadruple 21-inch tubes. She has long since ceased to be an anti-torpedo boat vessel, and is really a very large torpedo-gun boat; while the flotilla leader of 1,500 tons is almost a light cruiser.

Internal means of protecting themselves against this form of attack were provided in battleships at an early stage of what may be called the torpedo era. In 1879 the "Devastation" was refitted, and opportunity was taken to mount six of the new Nordenfeldt guns on the flying deck and a Gatling gun in the top. She was also given two electric lamps placed on platforms at the fore and after ends of the hurricane deck—the forerunner of the modern searchlight. The first crinoline net-defence was fitted in her successor, the "Thunderer," and this form of protection was retained right up to the early part of the Great War, when it was found to be incompatible with the mobility required in modern fleets. It has been superseded as a form of under-water defence in large ships by the bulge: originally an excrescence allowing the force of the explosion to expend itself before it could cause serious damage to the internal hull, in modern ships it is moulded into the lines so that it produces little or no impediment to speed. With the increase in size of torpedo craft it should be noted that the anti-torpedo boat armament of light Q.F. guns has become a formidable secondary armament of 6-inch guns.

HYDRAULIC GUN MOUNTINGS

The "Thunderer," completed in 1877, is interesting as being the first ship in which the hydraulic system of operating gun mountings, introduced by Messrs. Armstrong, was tried. This experimental gear was fitted in the forward turret which carried a pair of 12-inch 38-ton guns; the after turret had two 35-ton guns similar to the "Devastation." So successful has hydraulic machinery proved for heavy gun mountings that it has been retained in the Navy ever since, with the one exception of the battle-cruiser "Invincible," where electrically operated turrets were tried, but eventually converted to hydraulic power.

The year 1880 marks an important change in the armament of ships for the Royal Navy, as in that year it was decided to adopt the breech-loading system. For twenty years previously the muzzle-loading system had held sway, the first breech-loaders having proved unreliable; but with the increase in length of guns, breech-loading became necessary, and the change was hastened by the explosion which occurred on board the "Thunderer" in 1879, owing to the

double loading of a 12-inch M.L. gun. As a result of this development there was a rapid increase in the weight of guns used, and the competition between guns and armour became more intense.

The next ship to which we need refer is the "Inflexible," completed in 1881. In addition to a complete hydraulic installation for her turrets, including training engines—which in the case of the "Thunderer" had been steam—this ship was remarkable for the number of auxiliary machines of various kinds which she carried. She was the first ship to have electric lighting in turrets, also searchlights, and amongst other features were Sir William Thomson's compass and cross-connected anti-rolling tanks.

After the "Inflexible" some effort was made to construct ships in classes, and several were built in pairs, such as the "Ajax" and "Agamemnon," the "Edinburgh" and "Colossus," and the "Conqueror" and "Hero"; but the battle fleet was still composed of a collection of "samples," the outcome of continual endeavours to find a more perfect ship. It was not until the "Admiral" class were put in hand that a serious attempt was made to create something in the nature of a homogeneous division. This class consisted of the "Collingwood," "Camperdown," "Howe," "Anson," "Rodney" and "Benbow." The main armament of the first was four 12-inch 45-ton guns, that of the next four, 13.5-inch 67-ton guns, while the "Benbow" mounted two 16.25-inch 110-ton guns. The latter were the largest guns ever used in the Royal Navy with the exception of the 18-inch 150-ton guns with which the huge light cruiser "Furious," built during the War, was originally armed, but which were taken out very shortly after she was completed and mounted in monitors which operated off the Belgian coast.[1] The ships of the "Admiral" class also had a secondary armament of six 6-inch guns, except the "Benbow," which had ten of these weapons. Two later ships of a very similar type were the "Nile" and "Trafalgar," completed in 1890. This class was followed by the eight "Royal Sovereigns,"[2] designed by Sir William White, and these in turn by the nine "Majestics," with their four 12-inch guns in turrets and a secondary armament of 6-inch guns.

Except for improvements in detail, there was no radical change in the general design of British battleships until we come to the

[1] The use of guns exceeding 16-inch calibre is now prohibited by the Washington Treaty.

[2] One of this class was the "Hood," whose four 13.5-inch guns were mounted in turrets, instead of as in the remaining seven ships, on barbettes. To compensate for the extra weight, the ship was cut away forward and aft, and had a low freeboard, as in earlier classes.

"King Edward" design of 1902, with the most grotesque combination of 12-inch, 9.2, 6-inch, 12-pounder and 3-pounder guns that naval technicians and constructors have ever devised. The eight ships of this class were succeeded four years later by the two "Lord Nelsons," with their four 12-inch and ten 9.2 guns. They were a better design, but really only a half-hearted step to the all 12-inch "Dreadnought" design.

THE MODERN CAPITAL SHIP

The "Dreadnought" herself was hurried forward and completed before the "Lord Nelsons," and from now onwards we find a battleship type which, until the end of the War, changed only in details. With the "Orion" class of 1910, the 12-inch gun gave place to the new 13.5, and all five turrets were disposed on the centre-line instead of two being only on the broadside. In the "Iron Dukes" of 1913 the secondary armament was increased from 4-inch to 6-inch guns. Finally we come to the five "Queen Elizabeths" and the four "Royal Sovereigns," where the five turrets have been reduced to four, but the calibre of guns has been increased to 15-inch.

In the post-war battleships "Nelson" and "Rodney," laid down in December, 1922, and completed about five years later, we see a curious reversion in general outline to a very much earlier class, that of the "Sans Pareil" and "Victoria." Although very different in size and power, both designs have in common the feature that their main armament is massed forward and the secondary armament is in the after part of the ship, the result being a somewhat shovel-nosed appearance. These two latest British battleships represent the newest development in construction of ships of their class in this or in any other country. Their nine 16-inch guns are mounted in three triple turrets, and the twelve 6-inch in six twin turrets. They also have six 4.7 anti-aircraft guns. The torpedo armament is still retained in the form of two submerged tubes. Their maximum speed is 23 knots, and each ship cost about £7,500,000 to build.

Before leaving what is known as the capital ship type, reference must be made to the battle cruiser. This class of warship came in as a contemporary of the "Dreadnought" type of battleship, the first being the "Invincible," completed in 1908. Powerfully armed, with great speed, but poor protection, their weaknesses as fighting ships were made only too apparent in the battle of Jutland. Only three battle cruisers still remain in the Navy,[1] the "Repulse," "Renown" and "Hood." The two former are ships of 26,500 tons

[1] H.M.S. "Tiger" is being scrapped under the terms of the London Naval Treaty.

with an armament of six 15-inch and seventeen 4-inch guns, and a speed of 32 knots. The "Hood" displaces 41,200 tons and carries eight 15-inch and twelve 5.5-inch guns with a maximum speed of 31 knots. She is the largest, and is generally regarded as the most impressive looking, warship in the world, and so long as the terms of the Washington Agreement remain binding, she cannot be repeated or approached by any other Power, as the existing limit for capital ships is 35,000 tons

At the present time Great Britain, in company with the United States and Japan, is precluded by the London Naval Treaty of 1930 from laying down any further capital ships before 1936 at the earliest.

CRUISERS

Progress in cruising and lighter classes of ships, during this hundred years, proceeded on parallel lines to that of the heavier classes. As recently as 1886 we still find ships classified under the old term "frigate." Typical of this class was the "Inconstant," completed in 1868. She was an iron ship, with wood and copper sheathing, displacing 5,780 tons, and mounting ten 12-ton and six 6½-ton M.L.R. guns, her maximum speed being over 16 knots. She was followed in 1873 by the "Raleigh" and "Shah." Next came the corvette; one of the earliest types of this class was the "Active," launched in 1869, a ship of about 3,000 tons carrying ten 6-inch guns and steaming 15 knots. A large class of somewhat similar corvettes was built between the years 1876 and 1884. Typical of these was the "Calliope,"[1] a steel sheathed ship of 2,770 tons, with an armament of four 6-inch and twelve 5-inch guns and a speed of 13.75 knots. These vessels are of interest as being the last fully rigged ships laid down. Other forms of similar cruising ships were the second-class cruisers of the "Arethusa" type and despatch vessels like the "Mercury" and "Iris." A larger type were the armoured cruisers, the earliest of which were the three ships of the "Northampton" class, built between 1877 and 1880; they displaced 7,630 tons and carried four 10-inch and eight 9-inch M.L. guns, and were protected by a belt ranging from 6 to 9 inches, and a complete fore and aft protective deck. Their maximum speed was 14 knots; but as a type they were not a success.

In 1889 the Naval Defence Act was passed and provided for an expenditure of £21,500,000, spread over a period of years. The programme included ten battleships, but all the rest of the new construction was allocated to cruisers and torpedo gunboats. In this year, too, the "Aurora" class came into being. They were ships

[1] There is a fine model of one of this class in the Crypt of the Royal United Service Museum.

of 5,600 tons, with a speed of 18½ knots and armed with two 9.2 and ten 6-inch guns. They had a 10-inch belt and an armoured deck. In 1895 two notable cruisers, the "Powerful" and "Terrible," were launched. They were the largest "protected cruisers" ever built, and displaced 14,200 tons. The "Andromeda" and "Argonaut" classes, each of four ships of 11,000 tons, succeeded them. Then came the "Cressy," "Drake," "County," "Black Prince," "Warrior" and "Minotaur" classes: all armoured cruisers, which eventually gave way to the battle cruiser. The light cruiser has remained, and as a type is now the most numerous cruiser class in the Navy.

The Washington Agreement limited cruisers to 10,000 tons and their guns to 8-inch. The effect was to create a new class built up to the maximum of these dimensions. Typical of this is the "London,"[1] carrying an armament of eight 8-inch guns, arranged in pairs in four turrets, four 4-inch anti-aircraft guns, and eight 21-inch torpedo tubes. Somewhat similar, but rather smaller, are the "York" class, which carry six 8-inch guns. Since the London Naval Treaty has limited the number of 8-inch cruisers, and Great Britain already has her quota of these vessels, the cruisers now being built for our Navy are smaller ships carrying 6-inch guns.

SUBMARINES

The submarine can be said to date from 1801, in which year Robert Fulton produced the "Nautilus," a vessel having a propeller and in other ways much in advance of its time. But the development of under-water craft does not call for further notice until nearly sixty years later, when the French carried out experiments, and after another long interval, Goubet, in 1886, produced a design which was put in hand at Cherbourg. His craft was completed in 1889, and two men succeeded in remaining under water in it for the hitherto unheard of period of eight hours; but the type was not adopted.

Many other experiments were tried in succeeding years, but it was not until 1899 that a sum of money was raised by public subscription, and this enabled two submarines, the "Francais" and "Algerien," to be built, while at the same time the Government ordered four of another type. In 1901 provision was made for building twenty more boats and development then proceeded steadily. In Spain, experiments were carried out as early as 1860, and in 1888 a Spanish naval officer, called Peral, produced a boat designed on what might be termed modern lines. The United States built a

[1] A model of H.M.S. "London" may be seen in the Crypt of the Royal United Service Museum.

submarine called the "David" in the early 'sixties,' but nothing much was done until the Navy Estimates of 1893-4, when a sum was voted for constructing a small experimental boat. As the result of a competition, the contract was awarded to the Holland Company. In June, 1900, six more Holland boats were authorized, and in 1905 a further four.

Great Britain was surprisingly behind other countries in early submarine development and research. In 1878 experiments were carried out by Mr. Garrett, a curate of Liverpool, but the first large submarine to be built in this country was one to the designs of Mr. Nordenfeldt; this was built at Barrow and appeared at the Naval Review at Spithead in 1887. Mr. Nordenfeldt also built a submarine for Turkey, which ran trials in the Bosphorus but was not taken over by that Government.

In 1900 it was announced in the House of Commons that the Admiralty had been following the experiments with submarines in other countries with deep interest, and the Naval Estimates for 1901-02 made provision for the construction of five Holland boats. The first of these was "A.1," laid down at Barrow. Unfortunately, she was lost with all hands on 18th March, 1904: our first submarine disaster.

Since then the submarine has become a permanent unit of the Navy and has increased steadily in size and power. Two unusual types may be mentioned: one, the "K" class, built during the War for duty with the battle fleet, and notable because they had steam turbines for surface propulsion; another, the "M" class, were also built during the War, and carried the remarkable armament of a 12-inch gun.[1] The "K" class have been scrapped, as their underwater performance was not satisfactory, and one was lost in 1921. One of the "M" class also sank in 1925 as the result of a collision, and the remaining two have been converted—one to a minelayer and the other to carry a small seaplane.

The latest British submarines are the "O,"[2] "P" and "R" classes—craft of 1,475 tons surface and about 2,000 tons submerged displacement, carrying one 4-inch gun and eight torpedo tubes.

AIRCRAFT CARRIERS

An entirely new type of warship, which only came into being in the Great War, is the aircraft carrier. With the exception of the "Hermes," and, to a large extent, the "Eagle," the aircraft carriers

[1] This class of Submarine is now prohibited under the London Naval Treaty.

[2] A model of the "Osiris" is to be seen in the Crypt of the Royal United Service Museum.

in the British Navy have been converted from ships originally designed for other purposes. The oldest of this type is the "Argus," converted from a merchant ship, and the latest, the "Furious," "Courageous" and "Glorious," were converted from very large light cruisers. Their mission is to carry the aircraft of the Fleet Air Arm to sea so as to ensure as far as possible that the fleet shall always have aircraft in company, while the aircraft shall have a mobile landing-on platform to which to return at the end of their flight. As a type they are costly and vulnerable, but until seaborne aircraft can take off from, and alight on the surface in at least as bad weather as that in which aeroplanes can now fly off and land on an aircraft carrier, the latter appear to be indispensable.

PROPELLING MACHINERY

The century under review is particularly notable for the great progress which has been made in propelling machinery since the early days when steam was first introduced into warships. As we have already seen, the screw propeller ousted paddle-wheels at an early date, in fact the latter were obviously unsuitable for large men-of-war.

Another factor in producing more power for weight, was the improvement in boilers. In early steamships the boiler pressure was only 3.5 lbs. per square inch. A notable exception to this was the "Echo," built in 1827, which had the first cylindrical boiler, termed a "high pressure boiler," working at 15 lbs. per square inch. Pressures up to 10 lbs. were in use through the 'forties,' but not until about 1860 was a pressure of 20 lbs. achieved. Salt water was used in all the first steam vessels, the boilers being "blown down" periodically to get rid of the salt. It was the practice for many years to measure coal by "bushels." Although the "locomotive" type of boiler continued to be improved, the next real advance came with the introduction of the water-tube boiler, which was first adopted in battleships of the "Canopus" class in 1900. These boilers were of the Belleville type which later gave way to the Yarrow and Thornycroft designs, which have held the field since.

Next, in 1897, a small vessel named the "Turbinia," appeared at the Naval Review, and was destined to revolutionise propelling machinery. The first naval ships to be fitted with turbines, instead of reciprocating engines, were the destroyers "Viper" and "Cobra," both of which came to tragic ends, but through causes unconnected with their machinery. In 1903 a still larger man-of-war, the third class cruiser "Amethyst," was given turbines, and with the "Dreadnought" and "Invincible" classes, these became the recognised form of propelling machinery for all men-of-war.

Oil as an auxiliary to coal had been tried in certain ships of the "Majestic" class, but it was not adopted entirely until the "Queen Elizabeths" were built, in 1915. The battleships of the "Iron Duke" class and the battle cruiser "Tiger" which are being scrapped under the terms of the London Naval Treaty, were the last coal burning ships remaining on the active list.

THE GREAT WAR AND AFTER

The Great War, naturally, made huge demands for new construction. To a large extent existing designs were reproduced in greater numbers, especially as regards light cruisers and destroyers; but the war also called for ships of new design for special services; notable amongst these were monitors, with a main armament ranging from the 15-inch of the "Erebus" and the 12-inch of the "General Craufurd" classes, down to the 6-inch of the smallest "M" class; "P" boats, for escort work and submarine hunting; sloops; mine-layers and mine sweepers; aircraft carriers; seaplane carriers; kite balloon ships; motor launches (M.Ls.); coastal motor-boats; to say nothing of innumerable other auxiliaries with temporary armaments.

In addition, the war produced one or two "freak" ships, like the "Furious" and "Courageous"; while Lord Fisher's "Incomparable," had she ever been built, would have been 1,000 feet long, and would have carried six 20-inch 200 ton guns.

Whatever the Washington Agreement achieved, it put an end to that competition in capital ships which was threatening to produce veritable monstrosities, and it seems not unlikely that when the Powers come to review this class again in 1935, further limitations will be imposed on their size.

The five principal sea Powers also resolved to limit the size and armaments of cruisers and aircraft carriers, while Great Britain, the United States and Japan have agreed in the London Treaty to restrict the displacement and guns of destroyers and submarines.

Both these international pacts have aimed, too, at reducing the total tonnage of navies, and the tonnage of each of the several classes of war-ships; although complete agreement has not yet been come to in this respect so far as France and Italy are concerned. The effect has been that, to-day, Great Britain no longer has scope to build larger and more heavily armed ships than any other Power, and must rely upon the ingenuity of her designers and constructors to build ships which, while they are at least as good as those in foreign navies, are also best suited to her world-wide reponsibilities.

From the Original by T. Ivester Lloyd.

One of a series of Dioramas lent by The Department of Overseas Trade.

THE BRITISH ARMY OF LAST CENTURY

BALACLAVA

FROM THE DIORAMA IN THE R.U.S. MUSEUM

Photograph by The Topical Press.

THE BRITISH ARMY OF TO-DAY

A Hundred Years of the British Army

I. PERSONNEL AND ADMINISTRATION

By LIEUTENANT-COLONEL H. G. DE WATTEVILLE, C.B.E.

Assistant Editor R.U.S.I. Journal

THE Army in 1831 was suffering from the after-effects of the French Wars in which Great Britain had been engaged, to varying degrees of intensity, for close on twenty-two years. The nation as a whole was suffering from social, political and economic difficulties that had persisted ever since the Battle of Waterloo. A widespread disinclination was felt against facing any military problems, while extreme economy in regard to Army matters was accepted as a political dogma. Conditions were not favourable for any military policy that would alter the existing order of things, except in the sense of a reduction of strengths or expenditure. Neither was the situation of the Army within the nation at all conducive to any change. Pride in the victories of the Peninsula and Waterloo tended to be forgotten in the face of domestic crisis and of financial stringency. So the Army came to be considered more and more as the instrument of the Crown, only required to resist external aggression or to quell sedition at home. This attitude grew more marked as the troops were constantly being employed on purely police work for the repression of disorder resulting from strikes. It should be remembered that virtually no police forces of any kind existed in the country at this period, and that the Army had to fill that deficiency. The creation of the Metropolitan Police in 1829 was followed only at an interval of many years by the institution of borough and county constabulary forces. In the year 1831 riots were with difficulty put down with the aid of the troops in many parts of England, for it was still an age where industrial disputes inevitably led to violence and to insensate destruction of property. Even as late as 1848 the Duke of Wellington himself was called upon to direct the movements of the troops

summoned to protect London itself against Chartist rioters, and although these police tasks had very often been carried out by bodies of Yeomanry, the prevalent unpopularity of the Regular Forces could largely be ascribed to this cause. Finally, until the repeal of the Corn Laws in 1846, a number of Army detachments had also been entrusted with preventive duties which would now be regarded as forming part of the functions of the personnel of the Inland Revenue.

One evil effect of this conception of the soldiers' task was the resultant scattered distribution of the troops throughout the United Kingdom, particularly in Ireland. Outside London there were but a very few places where more than a few hundred men could be quartered together. Broken up into isolated detachments, regimental commanders found it more than difficult to supervise their men.

Abroad the distribution of the Army remained much what it had been at the close of the French Wars. Canada and the West Indies absorbed nearly 12,000 men; the Mediterranean stations 11,000; the Cape of Good Hope nearly 6,000; Ceylon 3,500. In all about 40,000 troops were stationed in the Colonies. Some 30,000 garrisoned India, without reckoning the East India Company's local European forces. In all 70,000 men were occupied overseas. A like total in theory was maintained in the United Kingdom, so that the troops should have spent at least five out of every fifteen years at home. But in practice, allowing for the numbers on voyage, for casualties and for shortage of establishments, even this proportion of home to foreign service was no certainty.

This distribution of troops remained much the same until the Duke of Wellington, then Commander-in-Chief, died in 1852. Its numbers may have fluctuated somewhat during that period, chiefly according to the temper of Parliament, since the actual number of men maintained by the Crown was for ever a source of dispute. The champions of economy made it their special object to try to reduce the total whenever the annual Army Estimates were placed before the House of Commons.

THE SOLDIER'S DAILY LIFE

In other respects, too, the Army of 1831 differed little from that which had existed since 1783, when Burke's Army Act had removed the regiments from the control of their colonels, although the latter remained largely concerned with all the necessary measures for paying, clothing, feeding and recruiting their men, making money out of these transactions. Generally speaking, similar conditions persisted until the outbreak of the Crimean War in 1854, although

certain very minor reforms were introduced to remedy in some small manner the lamentable lack of hygiene which pervaded the whole of the soldier's existence, both at home and abroad.

The private soldier's mode of life, indeed, during this entire period can only be described as deplorable. Indeed, existence in the Army was similar to that of a penal community, and it is amazing to find that men who made it their object in life to emancipate the negro slave abroad, or to ameliorate the lot of the convict at home, should have viewed without distress the miserable plight of the troops. Barracks were abominable. There seemed little hope of reform, since Parliament, viewing every building erected for soldiers as a possible fortress for the strengthening of the prerogatives of the Crown, would grudge even the smallest sum towards their construction or improvement. The sanitary conditions would have disgraced the worst of modern slum dwellings. The soldiers' food was bad, and consisted of two daily meals only. Beef and bread constituted the entire ration. Beer was the only relief to an existence of depression and squalor. Spirits of a vile description, as an alternative to beer, were but an incentive to military crime. The punishments of the period, chiefly flogging, were brutal. In 1831 a Regimental Court Martial could order 300 lashes, a District Court Martial 500 lashes. But the most astonishing feature of barrack life, that is, when judged by present-day standards, was the fact that the soldier was allowed to live as a married man in the barrack room, a corner of which would be screened off by blankets for the benefit of the women and children.

Enlistment in those days was usually for life, or in practice until a pensionable age was reached. A few efforts, repeated at odd intervals, were made during the long peace to alter these terms of service, but without much result. Desertion, it is not surprising, was frequent. On the other hand, bad characters were not so easy to discharge, the more so because recruits were not always readily obtained. The Militia, which constituted the only Reserve to the Regular Forces, was slowly being permitted to decline in numbers and efficiency, till it formed a negligible force by 1854.

The uniform of the period was not conducive to comfort or health. The reign of George IV had been marked by outbursts of sartorial extravagance that led to frequent changes and to unpractical clothes. By 1831 the uniform was more or less fixed. A scarlet swallow-tailed coatee was worn for all purposes. In winter the trousers were of blue grey tweed, in summer of white duck. A cumbrous chaco was the infantry headdress. But the worst features of the soldier's uniform

was his hard, quadrangular pack and the two broad crossbelts. These latter articles were detrimental to the free play of a man's chest. Pipeclay was freely used; without its frequent use the troops would have appeared dirty.

THE LIFE OF THE OFFICER

The circumstances under which officers served were also far from satisfactory; the main source of evil could be ascribed to the fact that officers purchased their commissions. Already a relic of past conditions, that system was so deep rooted as to render it a most thorny problem to tackle. In addition, the possible cost of compensating holders of commissions, together with the institution of retired pay for officers, would have caused almost any government to shrink from such a thankless task. Much scandal had already arisen in the past over the sale of first commissions to unsuitable holders, while the system had often caused intense dissatisfaction to the less favoured.

Only the death of the actual holder of a commission entailed the free grant of a step of promotion to all officers junior to the casualty. Hence the old subalterns' toast to "A bloody war."

Commissions were not cheap if the value of money be taken into account. Their price was enhanced by the inevitable practice of making an "over-regulation" payment over and above the authorized cost of the commission. Thus, after the Crimean War, the regulation price of a cavalry lieutenant-colonelcy was £6,175; the real normal price had grown to between £14,000 and £16,000. A company in the Foot Guards was assessed officially at £4,800, a lieutenant-colonelcy at £9,000. The actual price paid by the purchaser might be as much as £9,000 and £13,200. The cost of a company in the Line was fixed at £1,300, while £2,400 would usually be paid; a lieutenant-colonelcy, nominally taxed at £4,500, would fetch £7,000.

The effect of the system was to maintain in every regiment a number of elderly subalterns and captains, while majors and commanding officers might have as little as seven to ten years' service. The latter category often possessed less military knowledge, let alone aptitude, than many of their subalterns. The consequence was that numbers of the regimental officers really stood without any prospect of ever rising to any position commensurate with their merits or experience of war. They were mostly either younger sons of good county families with no financial resources, or impoverished members of the nobility; in the cavalry were to be found sons of wealthy merchants.

The officer's life was often not very stimulating. The barrack-square in the morning; social amusements in the afternoon; the mess dinner and wine in the evening—all this in small garrison stations where there existed no facilities for military pastimes as we now think of them. It is not surprising that drinking was a common habit, just as it was in society as a whole. Gambling, for those who could afford it, was rife. Occasionally there was the excitement of a duel, since duelling was an acknowledged practice, if variously regarded by commanding officers and clearly on the decline after the reign of George III. Less often there would be a race meeting, and more rarely still a prize fight.

The officers of that era undoubtedly indulged in field sports and in outdoor recreations, as all other men of a like station in life, but this can scarcely have been universal. The more moneyed and more senior officers obtained prolonged "Secretary at War's leave," during which they would visit their homes and live the usual life of country gentlemen. But it is difficult to see how many of their less fortunate colleagues could afford to absent themselves for long from their units. When doing duty it may be assumed that the poor pay, the lack of financial resources and, in many cases, the efforts made to save money to purchase a step of promotion, would prevent many from spending much on their amusements.

Professionally the education of the officer was lamentable. The only military books in possession of most of them were "The Articles of War" and Torrens' "Evolutions of the Army." Of military history very few knew even the barest outline. After Waterloo there was a rapid decline of all forms of study of war. The "Senior Department" of the Military College, that forerunner of the modern Staff College, was all but extinct.

BEGINNINGS OF REFORM

Before the Duke of Wellington's death in 1852 he had, however, introduced two reforms worthy of record. The first of these was the total prohibition of duelling in 1843; the second was the institution of an educational test for candidates for first commissions. Ensigns at that date were nominated from a "Horse Guards' List;" a few then passed through Sandhurst. They then purchased their commissions. In order to be placed on this list it was now required that all aspirants should qualify in a simple examination which, to the dismay of many who had been brought up in a classical curriculum, included mathematics, history and geography. It may be assumed the test was elementary and tempered to the candidate. In spite of a great outcry the test survived, eventually to form the basis for all examinations for first commissions and promotion.

The Duke was succeeded as Commander-in-Chief by Lord Hardinge. With the assistance of Mr. Sidney Herbert, a high-minded and capable man, then acting as Secretary at War, a new era seemed to open before the Army. In 1853 the first field exercises held since Waterloo were instituted at Chobham.[1] These exercises led to a revelation of deficiencies, particularly in the artillery, which Hardinge and Herbert set about trying to remedy. But in spite of this and other attempts at reform the time was too short before the outbreak of the Crimean War in 1854 to achieve anything of value. One legacy of the Chobham Camp, however, was the subsequent purchase of 10,000 acres of land, which became the nucleus of the future Aldershot training area.

THE CRIMEAN WAR

Such then was the British Army as the Crimean War found it. In spite of its many and serious shortcomings, the Army at heart was sound. The men in that severe ordeal exhibited a deep feeling of devotion to duty; the majority of the officers by their bravery and concern for their troops went far to atone for their lack of any preparation for war. Regimental traditions and the old characteristics of the British soldier of the Peninsula had persisted throughout the long peace. His discipline and patience, during the epidemics of cholera and other fevers that took so heavy a toll of the ranks, was beyond all praise; his conduct in face of the enemy above reproach. But the Army of 1854 was but a collection of individual regiments, without any training in combined work, and a complete lack of all those elements which go towards keeping an efficient army in the field.

The first fruits of war soon made themselves felt. Transport, medical and supply services were woefully inadequate; where they existed they broke down. The troops suffered from the results of a purely barrack-square training. Their uniform was unsuited to field service conditions; the leather stock still worn round the neck had to be discarded whenever hard work was in prospect; officers were glad to dress in plain clothes as soon as their duty was done. This last circumstance is perpetuated in the still prevalent custom of wearing mufti whenever permissible. In short the Crimean War marked the end of the old long-service army.

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[1] Punch celebrated the occasion in a poem which ended —

"The object was good and the object is gained,"
"Right sound is the teaching the troops have obtained."
"And we'll mark that M.P. as a short-sighted scamp"
"Who grudges one mil for the Chobhamite Camp."

Lashed into outbursts of hysterical indignation by the newly-arisen daily press, public opinion sought to find scapegoats for the appalling state of the hospitals and the inefficiency of all supply services at the seat of war. In particular, undeserved and unsuccessful attacks were made on the Commander-in-Chief, Lord Raglan, and his Quartermaster-General, Sir Richard Airey. But the fault should have been traced far deeper. Forty years of neglect and parsimony could not be made good in the course of a campaign; chaotic administration of an army could not be remedied by panic measures. Still the public wrath needed placating. So a drastic re-organization of Army Headquarters at home was undertaken.

THE UNIFICATION OF ARMY AUTHORITIES

The military administration of the period was ill-defined and not calculated to favour progress in either organization or even combatant technique. There were still four principal authorities upon whom the Army depended. These were :—

(1) The Secretary of State for War and the Colonies;

(2) The Commander-in-Chief;

(3) The Secretary at War;

(4) The Surveyor-General and Board of Ordnance.

In addition, the Militia, almost becoming moribund, was administered by the Home Office. The Commissariat, or supply department, was managed by the Board of Ordnance at home and by the Treasury overseas.

The Secretary of State who managed the Colonies had been given control of military operations by Pitt in 1794 as a temporary measure. After 1815 he had been allowed to retain this control, which was only applied to war conditions. The greater responsibility thus lay in the hands of the Commander-in-Chief. The Secretary at War, who stood at the head of a branch of the Commander-in-Chief's headquarters styled the "War Office," was regarded as the representative of his Chief in Parliament. The Board of Ordnance, the oldest of our military authorities, was among other duties responsible for the organization, recruiting and equipment of the Royal Artillery and Royal Engineers. These two corps were thus maintained on a different basis to the rest of the Army, since their officers were selected by nomination by the Board for training at the Military Academy. Commissions were not purchased. The colonels did not clothe their men. These circumstances then differentiated the gunners and sappers from the rest of the Army in a manner that has left its mark on these two arms to this day.

In the unification of these authorities that took place in 1855, the Secretary of State for War assumed his present position[1]. The Secretary at War became his subordinate, and his title finally disappeared in 1863. The Board of Ordnance was suppressed, its functions being absorbed jointly by the new War Office and the Commander-in-Chief. Clothing became a government concern, and a factory was started to fulfil this duty. The whole operation was a reform of great constitutional importance. But although the change appeared far-reaching, it was many years before it became real. The old sub-divisions long persisted within the new framework.

THE INDIAN MUTINY DELAYS REFORM

The Duke of Cambridge, who became Commander-in-Chief in 1856, though possessing undoubted qualities, could scarcely be regarded as gifted with the inspiration which goes to make great reformers. Then unfortunately, the Crimea was followed by the Indian Mutiny. Consequently, progress became slow, and much remained to be done to revivify the Army and still more to remodel its conditions of service. Moreover, at that time the most urgent military problem was found to be that of re-organizing the forces in India. The Proclamation of Queen Victoria in 1858 as Empress of India involved the assumption by H.M. Government of new and serious responsibilities. The "Queen's Troops" in India had hitherto comprised four regiments of cavalry and twenty-two battalions of infantry. The East India Company provided nine battalions of infantry and the whole of the artillery and engineers. The European Army thus numbered 40,000, while there were 240,000 Indians, making up 155 battalions of infantry and 21 regiments of cavalry. Three regiments of European cavalry, nicknamed "Dumpies," were raised by the Company in 1858 to supplement the Company's white troops.

The amalgamation of all these forces now became an urgent necessity, and gave rise to great difficulty. In 1859 there took place what was known as "The White Mutiny," when the Company's troops, particularly "The Dumpies," refused to accept a transfer to Imperial authority. The situation occasioned protracted discussion and much legal argument. But the military problem, which centred on the question as to whether a purely local service should exist in India or not, brooked no delay. Finally the matter was settled in favour of the system, which has, more or less, prevailed to this day. The Company's troops were absorbed into the forces of the Crown; the troops of the three Presidencies were brought under a single central authority, and a redistribution of forces ensued.

[1] The Secretariat of State for the Colonies became an independent office.

At home Sidney Herbert became Secretary of State in 1859, and much was effected in ameliorating the soldiers' lot. In particular new barracks were built; some provision was made for the married soldier; the Volunteer Force was resuscitated, while officers' training was improved. The uniform was modified and brought more into line with French models; the chaco, especially, was made smaller. But Herbert died in 1861. After him a repeated change of Secretaries of State precluded any fixed policy from being adopted. In particular the question of creating a real Reserve for the Army remained unsolved, in spite of some tinkering at the problem, while the overhaul of foreign garrisons still remained overdue.

THE CARDWELL ERA

Not until 1868 did there appear any hope of fundamental reform. In that year Mr. Edward Cardwell, perhaps the most forceful Secretary of State the Army has ever known, was appointed for the purpose of grappling with the task of reform. He assumed office at a time when the Prussian success of 1866, following on that of 1864, had profoundly stirred military thought. Already the American Civil War of 1861-1865 had given rise to uneasiness as to British military preparedness to meet a serious war. The latter contingency had appeared to grow more real ever since the scare of a war with France in 1858. The re-organization of the Army could not be allowed to wait longer.

Cardwell, though not possessing previous military knowledge, was not slow in grasping the fundamental needs of the moment. These were:—

(1) The re-organization of the War Office, which had not progressed very far since the outward amalgamation of 1855;

(2) A revision of the soldier's terms of service combined with the creation of an Army Reserve;

(3) A reform of the officer's position and promotion;

(4) A re-distribution of foreign garrisons.

It was not to be expected that these reforms could be effected at a stroke of the pen, nor that they would fail to evoke bitter opposition. Fortunately, the war of 1870-1871 in Europe gave additional weight to Cardwell's plans. As a matter of fact, these plans were never carried out to the full, although it may be said that by 1882 his work was, in the main, completed.

In 1870 Cardwell began with his War Office Act by which that Department was re-organized internally. The fusion of its various elements became an established fact. The Commander-in-Chief, very unwillingly it is true, was brought into the same building as the Secretary of State, a step which in practice came to mean far more than the juxtaposition of the soldier and the statesman and a considerable elimination of redundant work. The next measure was the abolition of the purchase of Commissions. Here Cardwell encountered the full blast of opposition and of age-long vested interests. In 1871 his Army Regulation Bill, which contained provisions for compensating financially the holders of commissions, was blocked by the House of Lords after passing through the Commons. Mr. Gladstone thereupon persuaded the Queen to abolish purchase by Royal Warrant on the ground that the whole system rested on this same authority. When the coup was announced there was a storm. But the Lords straightway accepted the Bill since it was needed to compensate the officers whose commissions had become valueless. Indirectly the measure led to the introduction, in 1875, of competitive examinations for admission into the Service, and to the institution, in 1881, of promotion examinations.

Then Cardwell took in hand the alteration of the terms of service of the soldier, combining these changes with the creation of an Army Reserve by means of the introduction of short service, as well as a re-organization of the whole method of furnishing foreign garrisons. As far back as 1843 efforts had been made in this direction but in vain. Herbert had attempted to achieve the same end in 1859. Royal Commissions had studied the problem in 1861 and 1866, and various stop-gap Acts had been passed to meet the needs of the moment. It was left to Cardwell's Army Establishment Act of 1870 to introduce the terms of service, which have held the field, more or less unchanged, until to-day.

This reform, however, was only part of a greater scheme. Not until 1872, after the bitter struggle over the abolition of purchase had been won, was Cardwell able to expound the proposals for the localization and linking of existing regiments. Although continuing in office until 1874, Cardwell never really completed his task, and he was fully occupied in consolidating his reforms; moreover the new terms of service could only bear fruit with the lapse of some years. The great scheme for the localization and linking of regiments, however, received much thought at the hand of two strong military Committees in 1872 and 1876. It was left to the care of Mr. Childers to bring the task to a successful end in 1881. Not before a struggle had been made to upset Cardwell's work. No other than Lord Airey,

formerly regarded as one of the most capable and progressive men in the Army, lent his name to a Committee whose true purpose was a return to the old order of things. But the attempt was in vain. So the Egyptian War of 1882 came as a final and fitting vindication to Cardwell's handiwork. As a farewell to a past age flogging was abolished in the Army at this time—amid the dire forebodings of nearly all old soldiers.

THE RESULTS OF CARDWELL'S WORK

The Army was beginning outwardly to assume an altogether new aspect. Moreover, although Cardwell had not really been able to influence the training or to reform the organization for war, he succeeded indirectly in altering the whole military outlook. Freed from the shackles of purchase, a number of able younger officers had been coming to the fore. A series of minor campaigns came to test the new order of things. These wars imbued the leaders with a deeper realization of wartime necessities, while they hardened the troops. The rigidity of the barrack-square training that still reflected the influence of pre-Waterloo day was yielding slowly. Prussian influence affected the higher command, just as it caused the introduction of the spiked helmet in place of the chaco in 1878. Clothing was becoming more rational. Khaki drill was adopted for wear in the tropics. Outdoor sports also began to affect the daily life of the soldier. Army cricket teams began to play regularly in the seventies. Football soon made its appearance, while all branches of athletics were winning their way into military favour. The advent of these recreations was in due course to bring about a new standard of military efficiency.

A yet greater change was effected in the eighties by the introduction of "squadron battery and company training." This reform gradually removed the responsibility for the training of the soldier out of the hands of the adjutant and sergeant-major and entrusted it to the men who would actually lead the troops in war.

There were, nevertheless, many lessons yet to learn. Higher training for war was still sadly neglected; staff duties were scarcely understood. The small wars of the period, although in many respects an admirable training, engendered too great a degree of self-confidence, while they encouraged a misconception of war on a larger scale. The muddle of the Zulu War of 1878-1879 had been followed by the bitter experience of Majuba in 1881. Yet easy success was no perfect training for future victory; the facile victory of Tel-el-Kebir could lead indirectly to the reverse at Magersfontein. Yet in the end these

minor campaigns were productive of good. Musketry began to be treated more seriously; the individual training of the soldier progressed greatly in quality. The influence of Colonel (Lord) Wolseley was making itself felt, though not without encouraging some ill-feeling in the Army itself. But a change in military doctrine or tradition could only be extremely slow. An army that prides itself on past achievements must of necessity remain at heart averse to change. So, drastic reform, to be truly effective, could only be very gradual; the task of adapting a conservative body like an army to radical changes brought about by law must be slow.

Meanwhile a further change of some constitutional magnitude was looming into sight. In 1890 the Hartington Commission, appointed to consider the administration of the Navy and Army, virtually recommended the abolition of the post of Commander-in-Chief, the formation of a Naval and Military Council, and the creation of a new department to be placed under a Chief of the Staff on the Continental model. Although not acted upon at the moment, the proposals led to the resignation of the Duke of Cambridge in 1895.

THE ABOLITION OF THE COMMANDER-IN-CHIEF

The Duke's successor was Lord Wolseley. But before the latter assumed office an Order in Council somewhat circumscribed the powers of the Commander-in-Chief on the lines of the Hartington Report. A "War Office Council" was defined, which consisted of the Commander-in-Chief, Adjutant-General, Quartermaster-General Inspector-General of Fortifications and Inspector-General of Ordnance. Wolseley, however, did not take very kindly to the new state of affairs, in which most members of the Council would have had independent access to the Secretary of State. Nevertheless, in spite of these internal differences in the War Office, the application of the Cardwell reforms continued to be so far effective that on the outbreak of the South African War in the autumn of 1899 the mobilization of the troops went off without serious hitch.

That War soon disclosed weaknesses which Cardwell could never have been expected to remedy in his all too short years of office. Indeed, many of these difficulties were of the Army's own making, and did not come from the civilian. It is needless to enter into any account of that War, although allusion must be made to the readiness with which the Dominions furnished contingents to assist the Mother Country, while the Yeomanry at home set an example by offering their services in large numbers for overseas. Volunteer Corps from all over Britain contributed Service companies to the Army at the front.

The defects in our military preparations were too serious to pass unremedied. The Army itself took the lesson to heart, although it seemed at first as though many of the changes would be worked to excess. Among many innovations modern service dress was introduced, and after several slight modifications became, together with the new web equipment, the uniform of the soldier of the Great War. Military education made great strides; the Staff College training gained greatly in importance. The Army, in short, was becoming entirely modern and then grew more "Continental" in its outlook.

But reform was also being pressed from without. Mr. Brodrick, then Secretary of State, in 1903 evolved his scheme for the division of the United Kingdom into six great military areas, each designed to furnish one complete Army Corps for service in the field. Three corps were to consist solely of Regular troops, the remainder were to be composed of Regulars and Auxiliaries. The scheme, though not ill-conceived, fell through, partly by reason of its cumbrous nature, partly owing to the expense which it must involve. But this division of the country was to survive, in addition to many lesser changes of that scheme.

Another significant innovation, which was to bear admirable fruit during the Great War, consisted in the reconstitution by the Prime Minister, Mr. Arthur Balfour, of the Committee of Imperial Defence. Yet a greater change was now to overtake the War Office itself. The Elgin Commission, appointed in 1902 to investigate the deficiencies revealed by the South African War, was followed by the more important Esher Committee of 1903. At the beginning of 1904 this Committee recommended the final abolition of the office of Commander-in-Chief, the institution of an Army Council under the chairmanship of the Secretary of State, and a re-distribution of duties within the War Office. This led to the retirement, in February, 1904, of Lord Roberts, who had been Commander-in-Chief since his return from South Africa in 1900, when he had succeeded Lord Wolseley on the latter's resignation from this high office.

THE ERA OF HALDANE

Nevertheless there was still much to do. The late war had proved that an organization for active service, sufficiently flexible to be capable of adaptation to all kinds of campaign in every part of the world was needed. The task of supplying this need was to fall to the lot of Mr. R. B. (Lord) Haldane, who became Secretary of State in October, 1905. The principle on which he set to work was to utilize

to the full all the available resources of the nation without imposing any fresh military burden on the country. Quality was to be set before quantity. Consequently, Haldane set about creating out of the materials at hand a small but very highly-trained force, ready to take the field at a moment's notice. In this manner there were organized the single Cavalry Division, the six Infantry Divisions and the Army Troops, which went to make up the British Expeditionary Force of 1914. In addition, Haldane converted the old Militia into the Special Reserve to reinforce the Regulars. He created the Territorial Force out of the old Volunteers. He was the sponsor of the new General Staff of the Army, although he did not remain to perfect the organism then called into being, this being the work of the soldiers.

Although this great re-organization entailed a reduction of 20,000 Regular troops, and although it encountered much severe criticism, mainly on the score of the conversion of the Volunteers into the Territorial Force, the work was soundly conceived. It was based essentially on the needs of war, and coincided with the changing requirements of foreign service. Opposition to Haldane's plans also arose from the fact that he championed voluntary service as against the proposals then being put forward by Lord Roberts and the National Service League for the introduction of some form of conscription. On the other hand, the extent to which Haldane's work was destined to involve Britain in the coming European conflict on the side of France seems to have escaped the comprehension, both of the majority of the House of Commons and of the nation. Anyhow the years 1905-1914 may be regarded as the most productive of progress that the Army had known since 1831.

THE GREAT WAR

The Great War came. The British Army proceeded to the help of France. The manner of its transport overseas, as well as the immediate demonstration of its fighting value, were proof of how well the reformers had accomplished their task. Had the Treasury sanctioned a greater expenditure on aviation and machine-guns, the return would have been infinitely greater. The same might be said of munition reserves. Perhaps in these matters Haldane had not been sufficiently insistent. His successor had sought to remedy the lack of aircraft, but there was too little time for this new branch to expand very far before war broke out.

It is not necessary to study the Great War in detail. By the summer of 1915 the British Expeditionary Force as such had ceased to exist.

It fought to the end and bequeathed to the Territorial Force, to Kitchener's new Armies and to the conscripts to come, some leaders, a few cadres, and a living example of duty nobly done. The War was carried on by its successors in the spirit of those who were no more. It is true that mistakes were made, but these could scarcely be laid to the charge of the troops. Much could be attributed to defects of national character, to tradition, to the ingrained tendencies of the new politics and of the new democracy. In some respects, perhaps, the Army was paying the price for the previous century's neglect and hide-bound conservatism. More than one generation is needed to eradicate habits implanted into a complex organism like an Army by two centuries of archaic routine. Small wars and the leading strings of financial and political control must have hampered the training of those destined to lead troops into the unfamiliar fields of a war that was unlimited as to casualties or money, just as it was heedless of political consequences. No more need be said.

THE POST-WAR EPOCH

After the War came the return to the conditions and organization of 1914. The creation of the Irish Free State in 1922 caused the reduction of the twenty-two Irish battalions of the Army, a circumstance which enabled a decrease of foreign garrisons to be effected whilst maintaining the Cardwell system. A further diminution of cavalry ensued, some being replaced by mechanized units. As a result the establishment of any future expeditionary force has been brought down to five infantry divisions, supported by one cavalry division. In other respects the speed of mobilization has been reduced.

On the other hand, there are two legacies of the Great War—the aeroplane and the tank—that have increased the combatant value of the Army to an unknown extent. Indeed, their potentialities are even now not definitely established, while their future proportionate strength and organization cannot yet be said to have even been approximately fixed. However, the conversion of the Army to a complete mechanical basis now seems to be but a question of time. Just as the year 1831 found the British Army seemingly resting on a firm basis of equipment and tactics, so a hundred years later everything seems problematic and full of uncertainties. Even the basic organization and armament that stood the test of 1914 is being called into question.

II. WEAPONS AND EQUIPMENT

By BRIGADIER M. L. WILKINSON, C.B.E.

Late Vice-President of the Ordnance Committee.

A CENTURY ago all development of the weapons and equipment of the Army was at a standstill. No progress could take place in a period during which an English Prime Minister had been justified in saying that the nation was peace-mad and that the soldiers who had saved it were cursed as plagues. Thanks to men like Shrapnel and others, British war material, up to the battle of Waterloo, had been second to none in quality among that of European nations. But now the country was sick of war and a period of retrenchment and rigid economies prevailed at home and abroad. The results of any studies that might be carried out could not be put into practice; indeed, there was little opportunity or inclination among the officers of the Army of those days for the study of the technology of their profession. The inspiration and influence of Sabine and the driving power of Lefroy were at work, but time was to pass before the results of their labours could materialise.

The infantryman still carried the old "Brown Bess," a flint-lock, smooth-bore musket of nominal .753 inch calibre. Conditions for the Horse and Field Artillery were very similar to those under which they had fought in the Peninsula and at Waterloo. They were armed with batteries of four 9-pr. guns and two 24-pr. howitzers—bronze smooth-bore pieces on wooden trails, axle-trees and wheels. Their ammunition was spherical shot and shrapnel shell, case shot and howitzer common shell. Coast defences, what there were of them, were armed with cast-iron 18 and 24-prs. on wooden garrison standing carriages—sometimes on traversable slides—and with various sizes of mortars. Transport was non-existent; nothing of that nature was contemplated beyond temporary and local improvisation, invariably a matter of great difficulty. Even the "Waggon Train" organization, which for years had existed in name rather than in fact, was definitely abolished in 1833.

EARLY CHANGES IN ARMAMENT

Between 1840 and 1850 two events occurred which deserve mention in connexion with the infantryman's weapon. Otherwise, no change in military armament took place.

In 1842 the percussion firing system, already extensively employed in firearms outside the Service, was adopted for the "Brown Bess," in order to increase its rapidity and accuracy of fire and to lessen its recoil and missfires. The copper percussion cap, on which the system depended, was the outcome of the percussion powder invented thirty-five years earlier by Forsyth, one of the select band of monks and clergy who have made invaluable contributions to the science of military material throughout the ages. About the same time the Prussian needle-gun, as yet undeveloped and unknown outside its own country, was being inaugurated and was later to exert a far-reaching influence on the armies of the world.

The advantage in accuracy of the rifled over the smooth-bore musket had long been recognized, but, hitherto, difficulties of loading with the barrel foul had stood in the way of the production of an acceptable rifle. In 1852 an expansible bullet, on the Minie principle, which had been suggested by Greener nearly twenty years earlier, was adopted. The actual Minie pattern rifles were employed in the Kaffir War of 1851 and in the Crimea, while in 1855 the Enfield rifle, on the Minie principle and with bore reduced to .577 inch was introduced and used in the latter part of the Crimean campaign and in the Mutiny.

An event of prime importance was the production in 1854, and definite acceptance in 1859, of the first satisfactory design of rifled breech-loading gun. Rifling had been experimented with in cannons, on and off, for three hundred years, and B.L. rifled pieces had been tried in England a hundred years before Armstrong produced this, the first really successful system. Converted rifled pieces, with spiral elliptical bores on the Lancaster principle, had also been tried but without success, in the Crimea. The backward state of knowledge in respect of metallurgy and mechanism had hitherto hampered progress, but it was obvious that some move in this direction had to come if artillery was to retain its superiority over infantry fire. This superiority, as the American Civil War clearly showed, was now threatened by the introduction of rifled small arms.

During this period the Crimean War and the fortification of the French Channel ports created a scare on the subject of coast defences. On the recommendation of a Royal Commission a "bricks and mortar" era set in, and the elaborate casemated forts that still form features of the Southern coasts of England began to spring up. Fortunately some provision was made in these for possible developments in guns and gun-mountings.

The rapidity of fire and destructive effect of the Prussian needle-gun in the wars of 1864 and 1866, even though this weapon was

inferior in accuracy and range to the British Enfield and other foreign muzzle-loading rifles, concentrated attention on the importance of a B.L. system for small arms, with the result that in 1867 a conversion of the Enfield rifle to breech-loading on the Snider system, employing Boxer's self-sealing metallic cartridge case, was adopted.

Throughout this period the Horse and Field Artillery were in process of re-armament, and batteries were being equipped with six 9- or 12-pr. Armstrong rifled breech-loading guns in place of their four smooth-bore guns and two smooth-bore howitzers. But the day of the breech-loader had not yet come. Although Armstrong guns had been employed in China in 1860 with a fair measure of success, the question was re-opened in 1863, and in 1864 rifled muzzle-loading guns were adopted. The B.L. system was not to appear again until 1882. There undoubtedly existed some obstinate aversion to new-fangled ideas among old-fashioned gunners at the time, but it would be unjust to attribute what, from this distance, appears a retrogade step to any general feeling of reactionary conservatism. During these years, committee after committee sat and thoroughly considered the whole matter. The rifled breech-loading guns were comparatively complicated, their ammunition was expensive and difficult to make, their breech-closing arrangements were neither simple nor altogether reliable, largely on account of the quick burning powder in use and the rudimentary knowledge of metallurgy then obtaining. Exhaustive comparative trials were carried out against muzzle-loading pieces, rifled on a French system with a small number of grooves, employing a studded projectile. The finding of every committee was emphatically n favour of the rifled muzzle-loader which, in the actual trials, more than held its own as regards range, accuracy and rapidity of fire.

Armour now began to appear on warships, and this demanded an increase of power in naval and coast defence ordnance. Not for the last time the coast defences experienced the handicap of requiring similar types of guns to the Navy, which had admittedly prior claims for supply, and had to wait till these claims were satisfied or even till cast-offs were available. Some heavy rifled muzzle-loading guns on steel or iron carriages and slides were provided, but for much of their armament the coast defences had to thank Palliser, a cavalry officer, who devised a system of converting smooth-bore cast-iron guns to a rifled muzzle-loading system by lining them with wrought iron tubes.

AN ERA OF MUCH PROGRESS

A definite fillip was given to military affairs by the general interest taken in the Franco-Prussian War. Following the work of Whitworth

and Metford, though not actually incorporating its details, the Martini-Henry rifle was adopted in 1871. With a reduced calibre of .45 inch, this steel-barrelled rifle was not free from prevalent fouling troubles, but it showed an advance in flatness of trajectory and accuracy. It proved itself a useful weapon. The need for a machine-gun had existed for some time, primarily to replace case-shot attack which was now outranged by infantry rifle fire, but the evolution of a successful design had been forced to await the development of the breech-loading system. The French *mitrailleuse*, on which extravagant hopes of winning the war had been centred in 1870, proved a grievous disappointment, largely in consequence of a faulty conception of its use and of defective training brought about by excessive secrecy. On the other hand, the American Gatling, used to a small extent in the Civil War and actually employed by the Americans as late as 1899, proved its efficiency. Used by the British in the Egyptian, Sudanese and Zulu campaigns, this gun was actually approved into the Service in 1874.

The outcome of the breech-loading and muzzle-loading controversy was that the Horse and Field Artillery underwent further re-armament, while coast defences began to receive guns of increased size and power, 10-inch R.M.L., 12.5-inch R.M.L., and even a few 80 and 110 ton R.M.L. pieces being produced and mounted.

Increased efficiency for the gun was the product of various factors. The work of Noble and Abel on slow-burning powders was bearing fruit and leading to increased length and "chambering" for the piece, while gas-checks, in addition to, or in place of, studs on the projectile, were producing longer ranges.

Altogether this period saw considerable activity in artillery matters.

An important change in the infantryman's rifle was signalized by the adoption, in 1888, of the Lee-Metford, a small bore—.303 inch—weapon, with an elongated composite bullet of lead in a copper envelope and a magazine, charged singly and used as a reserve. The machine gun, too, made a great stride forward. Maxim's single-barrel gun, in which extraction, ejection, feed, and firing were automatically operated by the recoil of the barrel, was adopted for the British Army in 1889. The introduction of this weapon marked an appreciable advance in fire effect, accuracy, and handiness over the old "coffee grinder" types of machine guns.

The Horse and Field Artillery continued in the throes of re-armament. Substitution of a 13-pr. R.M.L. for the old 9- and 16-prs. began, some of these pieces being employed in the Egyptian campaign of 1882; but it proceeded slowly and was not completed before

reversion to the breech-loading system took place. Conditions affecting the latter system had now changed. The production, abroad, of the interrupted screw-method of breech closing and the De Bange system of obturation, combined with advances made in the knowledge of slow-burning propellants and of steel for gun making, were overcoming the difficulties experienced in the early R.B.L. days. Consequently, in 1885, a 12-pr. B.L. gun was approved in replacement of the 9-, 13- and 16-pr. R.M.L. weapons. The appearance in France, about 1885, of *poudre B*, the first smokeless nitro-compound powder, and, a year later, of the *mélinite* shell foreshadowed the action to be taken by other nations in respect of smokeless propellants and high explosives.

THE SOUTH AFRICAN WAR

The 12-pr. B.L. gun, recently introduced for the artillery of the field army, was found to be too heavy for Horse Artillery duties, while it provided an insufficiently heavy shell for Field Artillery. A lighter 12-pr. gun of the wire construction, then being adopted, with a simple carriage, was consequently introduced for the former, whereas, for the latter, a conversion to a 15-pr. piece was effected, the use of the heavier shell being facilitated by the employment of Cordite, which was introduced in about 1890. It can be said that the 15-pr. acquitted itself well in the South African War. A cry as to being outranged, not unusual in war-time, was raised, but much of the trouble was due to the insufficient time of burning of the fuze. This defect was emphasized by the fact that Horse and Field Artillery, since 1891, were equipped with shrapnel shell only. The emergency was, however, considered sufficient for the hurried purchase abroad of some batteries of 15-pr. Q.F.[1] Erhardt guns for transhipment to the theatre of war. Though not fulfilling all requirements of a complete Q.F. equipment, these guns and carriages, when fitted with serviceable wheels, proved useful and deserve notice as being the first Q.F. long-recoil type gun—a type to be universally adopted in the future—that was introduced into the British Service.

The field-howitzer made its re-appearance in 1896, when a 5-inch B.L. howitzer firing a 50 lb. shell filled with Lyddite was adopted. A battery of these howitzers achieved the records of being the first to fire high-explosive shell, both not under precautions on the ranges and "in anger," if with indifferent detonation, in the Sudan in 1898. This latter occasion was the last time on record that the old-fashioned operation of breaching an enemy's walls was performed by our Artillery.

[1] Q.F.—quick-firing guns employing brass cartridge cases.

The glorified Maxim machine gun, known as the Pom-Pom, firing a 1-lb. powder-filled percussion shell was first encountered, and later used by us, in South Africa. As employed by the Boers up to a range of nearly 5000 yards with considerable accuracy, the effect of its string of viciously crackling shell was sufficiently unnerving, but further experience showed this effect to be more moral than material, and the weapon failed to live up to its first dramatic appearance.

Still more unpleasant was the experience of being shelled at long range from apparently inaccessible positions by heavy mobile guns. Owing to the neglect with which the question of guns of position had been treated, there was no adequate reply to hand. Not for the first nor last time hasty improvisations were the order of the day. First, 4.7-inch Q.F. guns, landed by the Navy with carriages of its own construction, and later, 6-inch, 5-inch and 4.7-inch guns on railway or travelling carriages, made up in local railway shops, were hurried into the field. From England there were sent out 5-inch B.L. guns on 40-pr. R.B.L. carriages and 4.7-inch Q.F. guns on 6-inch howitzer carriages. In the quest for something still heavier, 9.45-inch howitzers—the "quarter-to-tens"—were purchased abroad and shipped straight to South Africa. Though they subsequently enjoyed a voyage to China and remained an approved armament for some years, it cannot be said that these equipments ever rendered great service or were regarded with great affection.

During this period coast defences showed some definite progress. Numbers of 6- and 12-pr. Q.F. and some 4.7-inch Q.F. guns, types that the Navy had been employing for years, were made available and mounted for the defence of harbours against torpedo-craft attack. For the mounting of heavier armament the pendulum began to swing from ideas of protection to those of dispersion and concealment. The disappearing mountings in vogue for the 6-inch and 9.2-inch B.L. guns that were being introduced and the casemates for the R.M.L. guns that were still largely in use, tended to give way, where there was any height of site, to the inconspicuous barbette mounting with its simplicity and capacity for increased rate of fire.

Cordite and Lyddite, the latter for shells of guns and howitzers above 4.7-inch calibre, were firmly established and proving successful, while steel was coming into general use for shell in place of cast-iron.

The South African War had effects beyond khaki elections and attempts, happily abortive, to adopt the head-dress of a respected adversary. The interest of the public in military matters received a stimulus from the use of civilian soldiers, vociferously welcomed

on their return, while that of the regular soldier was undoubtedly quickened in questions affecting his profession.

The introduction of the short Lee-Enfield rifle, with its reduction of five inches in length of barrel and multiple magazine loading in chargers, encountered some opposition from the upholders of meticulous accuracy on the ranges. But it was held that any loss in this direction was more than counter-balanced by the handiness and suitability of the new weapon for prolonged snap-shooting. Under the influence, too, of the extensive use of mounted infantry in South Africa it was desired to provide the cavalry with a thoroughly efficient weapon for fighting dismounted. Subsequent experience in the Great War showed that no mistake had been made by those responsible for these decisions. The loss of reach in bayonet fighting, which was also used as an argument against the short rifle, was made good in 1907 by the addition of five inches to the length of the bayonet. The German "S" bullet, which appeared in 1905, set an example that had to be followed, since the pointed bullet, with its flat trajectory and consequent increase in dangerous space, constituted an important tactical advantage.

The manifest need for Q.F. field equipments, to facilitate quick loading and provide steady carriages on which detachments could remain in position during action under cover of shields, led to the introduction of the 13-pr. Q.F. for Horse and the 18-pr. Q.F. for Field Artillery. A correspondingly modern field-howitzer equipment, the 4.5-inch Q.F., was also adopted.

The South African War may be said to have re-introduced heavy batteries or guns of position. After the disturbing experience of that campaign a modern long-recoil 60-pr. B.L. equipment was produced and allotted to the field army, but in woefully small numbers. Behind this, in moveable armaments and with the Territorials, stood a 4.7-inch Q.F. gun on a short-recoil carriage with axle spade.

Then came the first move towards mechanization. In the Boer campaign, in addition to armoured trains and railway mountings for heavy artillery, use had been made of trucks, drawn by steam tractors over tracks on the veldt, for transport purposes between advanced bases and the troops. During the succeeding years committees sat and trials were made of mechanical means of conveyance of troops, machine guns, howitzers and various artillery and engineer services. The ban on petrol for military vehicles tended to hamper progress so that competition lay between the steam-driven wheeled tractor and the heavy oil lorry. The former, on account of its performances off the road and the value of its winding gear, found, perhaps, the greater favour.

In view of what was shortly to follow the country has good cause to be grateful to those who guided the progress of war material at this stage.

THE GREAT WAR

The period of the Great War, which witnessed the arsenals, engineers and scientists of the entire world concentrated on the production and development of munitions, must needs bulk large in any review, however brief, of the century's progress; even then it can remain but the sketchiest of records.

As suggested earlier, the British short Lee-Enfield rifle more than justified itself. In the hands of the British infantry it outclassed the rifles of enemies, allies and Dominion troops. It proved its reliability under every varying condition. Machine-guns suffered not from quality but from being heavily outnumbered at the outset. To obtain the requisite numbers of Maxims—now Vickers—that were required proved impossible, and the Lewis, a light gun with drum magazine, was introduced. In view of its mobility this gun was subsequently adopted as the machine-gun of the infantry, a Nordenfelt gun, better adapted for carriage by a mounted man, being introduced for the cavalry.

The main trouble for all artillery equipments originated from the unprecedented amount and rate of fire required from them, and the fact that they were, to large extent, in the hands of partially trained troops. Breakages of springs were unparalleled and, emphasized by the dearth of spring-making capacity in Britain, entailed the general introduction of the air recuperator. The usual cry for "more range," in this case more elevation, that in war-time takes the place of the cry for "less weight," was raised. But on the whole artillery material may be said to have answered gamely to the heavy calls made upon it. Towards the close of the War a new and steadier pattern of field artillery equipment, allowing of largely increased elevation, was produced, but it came too late to play any part in the War.

Of heavy and medium mobile artillery there existed a definite shortage. The arrival of the first 9.2-inch B.L. howitzer, which had been completed just at the outbreak of war, was warmly welcomed, but time was needed before more could be made available. The requirement was urgent, howitzers being in special demand on account of their length of life and the comparative simplicity of the problems connected with their siting. A sawn-off, bored-out, 6-inch gun on a naval cradle and traction-engine wheels, with large wood scotches to check recoil, formed a useful 8-inch howitzer outfit.

Heavy but robust, such equipments did good service in the form of warfare obtaining at the time, and a number of 6-inch guns were used in the same way. Intensive effort at home produced, eventually, the requisite numbers of 6-inch and 8-inch howitzers, and a new 6-inch gun, built on the latest lines and possessing the necessary powers of mobility.

On the establishment of trench warfare, two urgent and unexpected demands arose. Of the grenade, which, after a few sporadic appearances in warfare during a hundred and fifty years, had come to life in the Russo-Japanese War, something was known. A Hales stick pattern, for both hand and rifle, had recently been adopted, but German supplies were on a vastly greater scale. To the German *minenwerfer* there was no response available. Thanks to the energy and initiative shown in the theatre of war, many improvisations were produced and used, not, it is to be feared, without danger to their users. After much experience, good and bad, and after the appearance of many types, a Mills pattern grenade with striker and time mechanism was officially adopted. Supplies of trench mortars, from home, were at first slow and unsatisfactory. Experience of a weapon of this type was lacking and, with armament works and skilled engineering firms already overloaded, there was a tendency to relegate its manufacture to the backyard of the blacksmith's shop. The subject attracted the amateur inventor, and the authorities were flooded with preposterous proposals. Later supplies from home showed improvement in quality and quantity; while not ideal, they played a useful part, both in their primary role and in cutting wire. Eventually the efforts of Stokes and others, as well as the organization of manufacturing facilities, produced an adequate supply of efficient weapons.

Anti-aircraft artillery was, at the commencement of the War, unknown and unstudied, though the French had just introduced an automobile equipment. A 3-inch Q.F. gun and mounting had been produced for the Navy but, with pom-poms and percussion shell obviously useless and dangerous, the field army found itself without any anti-aircraft defence. Again, improvisation had to be hurriedly undertaken. A horse artillery gun, on a made-up mounting, on a L.G.O.C. omnibus chassis was the first equipment of this kind put into the field. Suitable sighting instruments and ammunition were, at first, lacking, but as some of the best brains of the country grappled with the theory of the subject, while the soldiers on the spot gained in experience and evolved their own methods, matters gradually improved. The guns and mountings retained much of their improvised form, but many improvements in details, ammunition and

appurtenances were successively produced. The 3-inch gun, on its naval mounting, was eventually brought into use on the automobile chassis, and actually remains the mobile anti-aircraft gun to this day: no small tribute to its designers of nearly twenty years ago.

The original conception of the tanks, the methods by which they were brought into being, and the secrecy and circumstances surrounding their manufacture, form an interesting story, but too long and controversial for present discussion. The need for some means of carrying forward armour, as a protection against modern rifle and machine-gun fire in the attack, had long been recognised. It was, however, the development of the internal combustion engine and the so-called caterpillar track that enabled difficulties of weight to be surmounted. The need was intensified by the volume of machine-gun fire and the copious use of wire along the German positions, which necessitated a devastating artillery bombardment with a prodigal expenditure of ammunition. The tank was first conceived and introduced by the British, though the French, who in the early stages had been working on a similar idea, produced their own type shortly afterwards. Some of the earliest pattern—a 28-ton machine, with a speed of four miles per hour, able to cross a ten foot ditch, and carrying eight men with 6-pr. Q.F. and Vickers machine-guns—were available by September, 1916, but they were not sufficiently numerous to carry out a surprise on a major scale with any hope of a decisive result. Actually the machines were then used, as some think mistakenly, in moderate numbers to resuscitate the Somme attack which was held up and, on the shell-torn ground they achieved only a partial success. Controversy as to their value and improvements in their details continued side by side and, after being used two or three times with varying and indecisive results, an improved pattern of machine was employed in November, 1917, this time with decisive results. Further successes by machines of still later pattern, in co-operation with French tanks, definitely established the tank as an engine of war, until it is now to be found in use in all armies.

The petrol ban had already been lifted in 1912, and the Great War became largely a mechanical war. Transport, staff-work, transportation of troops, the haulage of the heavier natures of artillery and the carriage of certain types, depended on the I.C. engine. The Holt caterpillar, despite its slow speed, proved its usefulness as an artillery tractor, though indeed Hornsby's machine, tried as far back as 1909, had held possibilities of development into something even more satisfactory.

THE AFTERMATH OF THE GREAT WAR

The aftermath of the War has been disposal of warlike stores, personal and material reductions, and rigid economy. It is true that research, design and experiment continue, but there is little chance for the experience, so hardly gained, to be put into practice on any considerable scale.

An improved pattern S.M.L.E. rifle, embodying in details the lessons of the war but showing no major changes, has been produced with a lighter and shorter bayonet, a reversion from the sword pattern. The lance, which from 1870 had been increasing in strength in all European cavalries, has disappeared from the Army. Artillery matters are studied and fresh problems faced—the tank, the machine-gun nest, the aeroplane, all demand their counters—but no major changes can yet be recorded.

Mechanization alone shows marked development and tends to a re-orientation of all military ideas. The armoured car, employed at times in the war as a useful, if irregular, auxiliary arm has been developed and standardized, and constitutes the fighting vehicle of the Royal Tank Corps in India. The substitution of these cars for horses in two British cavalry regiments has marked a turning point in military history. Mechanization of the artillery proceeds with caution. Time and experience are needed before the most suitable tractor can be found and money is limited. Full track "dragons," large and expensive, a variety of half-track machines, perhaps scarcely maintaining the first reputation achieved by this type, and six-wheelers, conspicuous and vulnerable to rifle and machine-gun fire, have had lengthy trials. It seems likely that a smaller full-track machine will emerge and questions of carrying detachments and ammunition will have to be faced. Tank development seems to point to a 16-ton fighting tank, armed with 3-pr. Q.F. guns and machine-guns, with a speed of 20-30 miles an hour, and a two-man tank with a rather higher performance, evolved from the type originally proposed for machine-gun carrying and reconnaissance purposes.

This brief and incomplete survey of army material of a hundred years shows that we have travelled far. It is hard now to realize the conditions of 1831. But of that time it has already been said "the country was sick of war and a period of retrenchment and rigid economies prevailed at home and abroad. The results of any studies that might be carried out could not be put into practice." Truly in some respects we have travelled the full circle.

From the Original Water Colour. *By courtesy of J. E. Hodgson, Esq.*

AVIATION A HUNDRED YEARS AGO

GREEN'S "VAUXHALL" OR "NASSAU" BALLOON OVER THE MEDWAY. THIS BALLOONIST MADE AN ASCENT BEFORE WILLIAM IV, IN 1831.

BLACKBURN "RIPON III"
TORPEDO BOMBER.

BLACKBURN "IRIS III"
COASTAL PATROL FLYING-BOAT.

Photographs by courtesy of the Aircraft Firms.

VICKERS "VILDERBEEST"
TORPEDO BOMBER.

HAWKER "FURY"
SINGLE-SEATER FIGHTER.

HAWKER "HARTS"
DAY BOMBER, OR FLEET FIGHTER AND RECONNAISSANCE.

TYPES OF SERVICE AIRCRAFT—1931

A Hundred Years of Service Aviation

By H. A. JONES, M.C.

Author of the Official History of "The War in the Air"

TO write of a hundred years of Service aviation is, may be, to draw the long bow. But although it is true that all important developments were, perforce, subsequent to the achievement of the Wright Brothers in 1903, Service flying goes back much farther than that. The Army, indeed, may look well beyond the century, and claim the first Knight of the air, in a young Irish officer, Richard M'Guire, who earned that distinction for a feat performed in 1785. He was on a ground in Dublin, watching the efforts of an aeronaut, Crosbie by name, to get away in a balloon. When he realized that Crosbie was too weighty for the enterprise, M'Guire jumped into the basket, threw out ballast, and soared into fame. Eventually he came down in the sea, nine miles from the shore, but he was rescued and, on returning to Dublin, was acclaimed a national hero. The fact that he was knighted for his exploit rather than damned for his foolhardiness would seem to imply that the military authorities, even at that early time, had a lively appreciation of the war potentialities of "aerial vessels."

Interest was undoubtedly stimulated by this event, but since the first balloon flight in France, two years before, this form of aviation had been a subject for general conversation. "Balloons," wrote Horace Walpole, "occupy senators, philosophers, ladies, everybody." Nevertheless, the Army continued to maintain a somewhat detached attitude towards flying, even though enthusiasts made some play with the fact that a French general had already produced designs for a dirigible balloon to be driven by propellers worked by manual labour.

The French Republican army first used a captive balloon at the battle of Fleurus in 1794. One was used in the Peninsular Campaign. Balloons were used by the Austrians against Venice in 1849, by the Federals in the American Civil War, and by the Brazilian army against the Paraguayans in 1867. But although in these various campaigns

there were instances of useful reconnaissances, and even of military bombing, it is true to say that the balloon was a symbol and a portent rather than an effective adjunct towards military success.

THE BALLOON SECTION, ROYAL ENGINEERS

In England, military experiments with balloons did not begin until 1878. In that year the Royal Engineers took up the work at Woolwich and, pushing ahead with characteristic energy, possessed, in the following year, a fleet of five balloons. One of these was with the troops on manœuvre at the Easter Volunteer review at Brighton and was marched past at a height of 250 feet. In 1880, and again in 1882, a balloon section was present at the Aldershot manœuvres, and the impression created was so favourable that it was decided, in 1883, to set up a balloon factory and school of instruction at Chatham.

In the autumn of 1884 balloons first went on active service. A detachment with three balloons was sent with the expedition that left for Bechuanaland to expel the filibusters who had raided the territory. As it happened there was no fighting and the balloons had no chance to show their worth. A native chief, however, who was taken up in the basket of one of them was impressed. "If the first white men," he said, "had brought a thing like that and had demanded that we should worship and serve them, we would have done so." In the following year balloons were used in the Sudan, and the Royal Engineer observers made some notable reconnaissances, especially at El Teb and Tamai.

In spite, of these activities, however, the balloon section formed no properly recognised part of the British Army, but in 1889 a lucky chance brought official recognition. In that year Sir Evelyn Wood, in command of the Aldershot Division, asked for a balloon detachment to take part in the manœuvres. When these were in progress, a balloon observer was asked to report on the disposition of an enemy column which, with a skilful use of deduction, he did. On his information a surprise night attack was made which was completely successful. Sir Evelyn Wood became a firm supporter of the new air weapon and, largely as a result of his advocacy, the balloon section was formally introduced into the Army as a unit of the Royal Engineers in 1890. The balloon depot and factory were moved to South Farnborough where they settled as the progenitors of the present Royal Aircraft Establishment.

Four balloon sections took part in the South African War, but there was still some prejudice against them, and it was reported that the artillery failed to take full advantage of the help they might have

given. Nevertheless, they did good service in reporting on the Boer positions and there were many instances when they were successful in directing fire on the enemy.

In May, 1906, Colonel J. L. B. Templer, the pioneer enthusiast of British military ballooning, was succeeded in the command at South Farnborough by Colonel J. E. Capper.[1] This officer, in a lecture given just previously at the Royal United Service Institution, had said : "In a few years we may expect to see men moving swiftly through the air on simple surfaces, just as a gliding bird moves . . . Such machines will move very rapidly, probably never less than twenty and up to a hundred miles an hour ; nothing but the heaviest storms will stop them. They will be small and difficult to hit . . ."

In view of such a prophetic utterance it is not surprising to find Colonel Capper doing all he could, by various shifts and devices, to encourage aeroplane enthusiasts. But funds were short and not much could be spared from what was required to fulfil the Government's intention of building dirigible airships. The grant for the first British dirigible had been made to the Factory in 1903, but it was not until 1907 that this ship, the "Nulli Secundus," was ready. After a flight to London in that year, she was re-built as a semi-rigid, but she suffered various mishaps and was ultimately deflated. A smaller airship, the "Baby," was put in hand in 1908, and was finished in the following year. She was then cut in half, enlarged, and renamed the "Beta"; in 1910 she made a night journey to London and back. Other small airships, the "Gamma," "Delta," "Epsilon" and "Beta II," were designed up to 1913. Their chief use was that they enabled wireless officers of the Royal Engineers, notably Major H. P. T. Lefroy, to make pioneer experiments in the use of wireless in aircraft.

THE AIR BATTALION

Meanwhile interest had long since shifted from the balloon and the airship to the aeroplane. The gliding experiments of Lilienthal in Germany, Pilcher in England, Chanute and, later, the Wright Brothers in America, had made flight by heavier-than-air craft a certainty so soon as a suitable engine appeared. With the introduction of the petrol engine the triumph of the Wrights' was inevitable. Although their first flight was made in December, 1903, it was some years before the significance of their achievement was realized. In 1908 Wilbur Wright brought one of his machines to France and demonstrated it at Le Mans. The result was to bring great

[1] Now Major-General Sir J. E. Capper, K.C.B., K.C.V.O.

encouragement to the French pioneers who had already made considerable progress on their own account.

At the beginning of 1909 flying was still regarded as being something of a mystery, but the cross-channel flight of Blériot in July of that year brought home to the people in England that they no longer enjoyed the isolation hitherto associated with living on an island. A few British enthusiasts had, meanwhile, taken up the new sport after learning to fly in France, and returned to England as apostles for the air. Among them were a few Army officers, notably Captains J. D. B. Fulton and Bertram Dickson, and Lieutenant Lancelot Gibbs, and these three were present, with their aeroplanes, at the 1910 manœuvres. Mr. Robert Loraine also appeared at these manœuvres in a Bristol aeroplane fitted with a wireless set and he succeeded in sending messages to a temporary ground station.

The work of the civilian pioneers, all of whom served the nation at some time or another, would make a long, colourful story of dogged courage; but even this brief account cannot omit the names of Mr. S. F. Cody, a gallant figure who was supplying kites to the Factory in 1904, and who built and flew his own aeroplane in 1908; of Mr. A. V. Roe, a marine engineer who, from 1906, devoted all his time and money to aviation, and produced the famous Avro biplane which became the standard training aeroplane of the air services; of Mr. T. O. M. Sopwith who, from modest beginnings in 1911, produced the long list of aircraft made famous by their exploits in the War; of Mr. J. W. Dunne who joined the Factory in 1906 and later built the novel Dunne aeroplane; of Mr. Geoffrey de Havilland who had a hand in the best of the officially designed aeroplanes; and of Mr. J. T. C. Moore-Brabazon, officially credited with the first free flight in England in April, 1909. Other names come crowding in from these pioneer days: Messrs. F. Handley Page, Percy Grace, the Blackburns, C. R. Fairey, José Weiss, Gordon England, Alec Ogilvie, Horatio Barber, Howard Wright, Cecil Grace, the Hon. Charles Rolls, Mr. Holt Thomas, the Hon. Alan Boyle, Graham Gilmour and Grahame White—to name but a few of those whose deeds are now inscribed in history.

Towards the end of 1910, the Bristol Company came to an agreement with the War Office and established themselves at Larkhill where they opened the Bristol School of Aviation. The British Government was now confronted with the fact that aviation had passed beyond the experimental stage, and, made uneasy by its rapid progress on the Continent, took action. On the 1st of April, 1911, the Air Battalion of the Royal Engineers was formed, charged with the "duty of creating a body of expert airmen." The Battalion,

which superseded the Balloon School, was to be fully responsible for the instruction of men in handling kites, balloons, aeroplanes, and other forms of aircraft. It was to consist of a headquarters at South Farnborough, and two Companies, No. 1 (Airships, South Farnborough), and No. 2 (Aeroplanes, Larkhill).

THE ROYAL FLYING CORPS

The Air Battalion, however, did not last long. Progress abroad was leaving this country too far behind, and, in December, 1911, the Government set up a committee to elaborate all the details for the formation of a national air service. The report of this committee, outlining the organization for a Royal Flying Corps, divided into naval and military wings, was accepted by the Government and the new service came into being on the 13th May, 1912. The military wing was to comprise seven aeroplane squadrons, providing twelve aeroplanes each, and one airship and kite squadron providing two airships and two flights of kites. The training of pilots for both branches of the service was to be the duty of the Central Flying School to be established at Upavon. By January, 1914, six of the aeroplane squadrons had been formed; a seventh began forming in May, 1914, but existed only as a nucleus when war broke out.

THE ROYAL NAVAL AIR SERVICE

Naval aviation goes back to 1908, when Captain R. H. S. Bacon, R.N., the Director of Naval Ordnance, submitted proposals for the construction of a rigid airship for fleet reconnaissance work. As a result the first of the naval rigids, popularly called the "Mayfly," was built by Messrs. Vickers, but when she was brought out of her shed in September, 1911, she broke her back and was wrecked. This disaster ended naval airship effort for the time being.

Meanwhile Mr. F. K. McClean[1] had, by a sporting offer, enlisted the interest of the Admiralty in heavier-than-air craft. In February, 1911, he told the Admiralty that he would provide the aeroplanes for the flying instruction of four naval officers. This offer was accepted and four volunteers (Lieutenants C. R. Samson, R. Gregory and A. M. Longmore, R.N., and Captain E. L. Gerrard, R.M.L.I.) were given a course of flying instruction by Mr. G. B. Cockburn at the ground of the Aero Club at Eastchurch, and of technical training at the adjacent works of Messrs. Short Brothers. In December, 1911, the Admiralty bought the aeroplanes which had been loaned to them by Mr. McClean and set up the first naval flying school on a ground next to that of the Aero Club. Just before this, in November, two

[1] Now Sir Francis McClean.

naval officers had fitted floats to an Avro machine and had made the first seaplane flight in England.

The Navy, having made a beginning with aeroplanes and seaplanes, turned once again to airships. The progress made in Germany with airships led to the reconstitution, in September, 1912, of the naval airship section which was attached to the airship squadron of the military wing at Farnborough. Orders for a Parseval airship were placed in Germany and for an Astra-Torres in France, and both these ships were delivered in 1913. In July of that year the Admiralty laid down a programme for the construction of two rigid airships and six non-rigids (Parsevals and Forlaninis). The two rigids and four of the non-rigids were to be built in England, while one Parseval was to be constructed in Germany and one Forlanini in Italy. When the war came, work on the one rigid already laid down was abandoned, the Parseval building in Germany was confiscated, and the two Parsevals building in England were delayed; they were not completed until 1917. The building of the Forlaninis was given up.

Following the formation of the Royal Flying Corps, a special Admiralty department—the Air Department—had been set up under Captain M. F. Sueter, R.N. In September, 1913, it had been decided that the Navy should take full control of all lighter-than-air craft and, on the 1st of January, 1914, the naval and military airship sections at South Farnborough had been amalgamated under Admiralty control, whereupon No. 1 Squadron of the military wing had been reconstituted as an aeroplane squadron. On the 1st of July, 1914, the separate existence of a naval air service was officially recognized, when the naval wing became the Royal Naval Air Service with a constitution of its own. Thence afterwards the term Royal Flying Corps was looked upon as being synonymous with the military wing. The Royal Naval Air Service, in August, 1914, included 128 officers, 700 ratings, 39 aeroplanes, 52 seaplanes, and 7 airships, and there were nine naval air stations at home.

ARMY AVIATION IN THE GREAT WAR

Almost the whole available resources of the Royal Flying Corps were put into the field on the outbreak of the War, and four squadrons, comprising 105 officers, 755 airmen, and 63 aeroplanes, crossed to France. The primary duty of the squadrons at this time was reconnaissance. Sir David Henderson, the commanding officer, had been Kitchener's right hand man in the later stages of the South African War and had then reorganized the whole system of military intelligence. He had thereafter written text-books on *Field Intelligence* and the *Art of Reconnaissance.* Under his guidance the officers

of the Flying Corps had been highly trained to take advantage of just such an opportunity as came to them during the retreat from Mons, and their reports laid bare the enveloping threats of Kluck's army and its sudden change of direction southwards.

When the opposing armies settled to trench warfare, the squadrons developed wireless co-operation with the artillery, air photography, air fighting, bombing, co-operation with attacking infantry (contact patrol), and low-flying attacks on troops, guns, and transport, during battle. By August, 1915, some of these developments were under way, and others had been foreshadowed. It was clear that progress in the field would be conditioned by the efficiency of the supply and training organization in England, and Sir David Henderson handed over the command in France to Brigadier-General Trenchard, and returned to the War Office to resume his appointment as Director-General of Military Aeronautics.

The battles of the Somme in 1916 may be said to have marked a turning-point in the history of the Royal Flying Corps. In those battles the fighting squadrons enjoyed a temporary technical and numerical superiority over those of the enemy and, used with sound strategical direction, dominated the air well over the enemy's back areas. The result was that the corps squadrons, in a position for the first time to co-operate with the Army on a full scale, enjoyed great freedom of action. Those highly-placed officers who had hitherto been reluctant to acknowledge the value of aircraft co-operation, were wholly converted as a result of their experiences during the Somme battles. It is a truism that nothing succeeds like success. In the world of industry this truism often finds expression in overtures for control made by older established concerns. When this happens the new competitor knows that he has "arrived." Something of the same process may be seen repeatedly in the history of weapons. It is not surprising to find, therefore, when the Somme battles ended, that there was a well-directed and powerful movement in the Army to obtain control of the co-operating air squadrons. First the Fourth Army commander and then the First Army commander submitted proposals to the Commander-in-Chief, whereby the corps squadrons would be placed under the direct orders of the Corps Artillery Commanders. The arguments against this proposal were well and reasonably stated by Major-General Trenchard.[1] In the result, Sir Douglas Haig, who was throughout the war a firm believer in the value of aircraft co-operation, and a warm friend of the Flying Corps, set his face against the idea which was not, in his judgment, in the best interests either of the Army or of the Royal Flying Corps.

[1] See "The War in the Air," Vol. III, pp. 308-9.

At the end of 1916, the squadrons in France were evenly divided between fighting and corps work; but air fighting developed with such intensity towards the end of the Somme battles as to make it clear that this form of air activity would direct and dominate the future growth of the Flying Corps. At the end of November, 1916, Sir Douglas Haig asked for twenty fighting squadrons additional to those requested in his detailed expansion programme of five months before. This would give twice as many fighting as corps squadrons. As will be told later, this demand reached the authorities at home at a time when the supply sources available to the Flying Corps were beginning to dry up, and was a contributory factor in the evolution of a separate air force.

So far as the corps squadrons are concerned, developments after the Somme battle were chiefly in the details of co-operation. But so much did air fighting increase that all distant work had to be undertaken by formations. With the grouping of four homogeneous fighting squadrons under Richthofen—known as Richthofen's Circus—in the Summer of 1917, the concentration of fighting strength in large formations became common. At the Armistice the number of squadrons in France had reached ninety-nine. By this time the establishment for each squadron was twenty-four aeroplanes, just double what it was on the outbreak of war. This great expansion in the air force had been accompanied by decentralization in the commands. In November, 1914, wings had been formed to group two or more squadrons, while, in January, 1916, wings had again been grouped to form brigades.

NAVAL AVIATION IN THE GREAT WAR

The war development of the Royal Flying Corps was simple as compared with that of the Royal Naval Air Service. As soon as the war began the Flying Corps squadrons were in a position to give immediate help to the Army, but the naval squadrons could do little to help the fleet. On the outbreak of war, Mr. Winston Churchill decreed that the primary duty of the naval airmen was to repel attacks by hostile aircraft, a duty that was, traditionally, the responsibility of the Army and, therefore, of the Royal Flying Corps. But there were no military aeroplanes available for home defence, a fact which was formally recognised in September, 1914, when Lord Kitchener arranged with the Admiralty for the Naval Air Service to take on this task.[1] Starting with small beginnings in 1915, there grew up a great

[1] Responsibility for home air defence passed back to the War Office in February, 1916.

naval air organization at Dunkirk. This operated against the German Zeppelins and their bases, and the enemy aerodromes in Belgium, in conjunction with the ships of the Dover Patrol, against the hostile bases on that coast and the 'U' boats working from them.

Aircraft co-operation with the fleet offered many difficult problems. In December, 1911, Commander Samson had flown off a specially built trackway in H.M.S. "Africa," but thereafter there had been little progress in flying off the decks of ships. In October, 1914, the old Cunarder, "Campania," had been bought for conversion into a seaplane carrier, and had been fitted with a 120-foot flying deck for the possible use of aeroplanes. Other smaller ships, the "Empress," "Engadine" and "Riviera" had also been taken over for conversion on the outbreak of war. There was, however, no great forward step in this problem until the Navy adopted the aeroplane instead of the seaplane for fleet work. In November, 1915, a naval pilot had flown a Deperdussin monoplane off an improvised platform in the light cruiser "Aurora," but the run required was judged too long for practical purposes and there had been no immediate development in this form of flying . In 1917, an extemporised platform was fitted in the "Yarmouth," and a Sopwith "Pup" was successfully flown off it in June. Two months later a "Pup", flown from this ship, by Flight-Lieutenant B. A. Smart, destroyed the Zeppelin "L.23." This success gave great impetus to the work of fitting light cruisers to carry fighting aeroplanes. The problem of the flying-off deck was solved and now came the question of flying on again. The chief difficulties were to overcome the air disturbances set up by the super-structure of the ship when she was steaming at a high speed into the wind, and to bring the aeroplane to rest quickly once it had been landed. Promising experiments were made with arresting gears and, in August, 1917, Flight Lieutenant E. H. Dunning made the first successful landing on the forward deck of the "Furious" in a Sopwith "Pup."

Meanwhile Grand Fleet pilots achieved revolutionary successes in another direction. The great drawback of flying off ships was the need to turn the vessel into the "felt" wind, a manœuvre which involved a loss of position relative to the fleet, and for this reason the fitting of aeroplanes in capital ships had not been approved. On the suggestion of Lieutenant-Commander C. H. B. Gowan experiments were conducted in the battle cruiser "Repulse" with a revolving platform on the top of "B" turret. The pioneer flight from this platform was made in October, 1917, by Squadron Commander F. J. Rutland. A great problem was thereby solved; not only could

aeroplanes be flown from a revolving platform without the course of the vessel being changed, but the turrets of capital ships could be used without interference with the sighting of the turret guns. The result of these various experiments was that the Admiralty decided to fit light cruisers and battle cruisers to carry fighting aeroplanes, and to convert the "Furious" to provide an after landing-deck 300 feet long. It was by Sopwith "Camels," flown from the "Furious" that two of the large Zeppelin sheds at Tondern, together with the airships "L.54" and "L.60," were destroyed in July, 1918. The next ships to be converted as aircraft carriers were the "Vindictive," the "Argus" (the first ship to be fitted with a flush deck), the "Eagle," and the "Hermes." The last two ships were not completed at the Armistice.

Next in importance was the development by the Naval Air Service of the flying-boat, with which the name of Commander J. C. Porte must be associated. This officer returned from America on the outbreak of war with a twin-engined Curtiss flying-boat, called the "Small America." From this developed the "Large America" and the Porte flying-boat In the production of these aircraft many supply difficulties had to be faced, but by 1917 there were enough available for the institution of Zeppelin and anti-submarine patrols. The patrols were begun in April and success came quickly. The German airship "L.22" was shot down in May, 1917, and the "L.43" in June. In May, also, the submarine "U.C.36" was destroyed. Another (possibly the "U.B.36") was almost certainly destroyed in June, and July saw the end of the "U.C.1" and the "U.B.20." In September the flying-boat scored another success when the "U.C.6" was sunk.

For searching inshore waters, the Navy initiated the small type airship, the "S.S." or submarine scout, in 1915. Improved variants of this type were the "Coastal" and the "North Sea" airships. The Admiralty also resumed construction of rigid airships at the end of 1915, when three of the "23" class were ordered. Five more were ordered in 1916 and by 1918 six had been completed. The "33" class were commenced in 1917 and sixteen of these ships were laid down; eleven of them were under construction at the armistice. It is estimated that British airships flew over two million miles on anti-submarine patrol during the war, and when it ended there were 103 airships, including five rigids, in commission.

The Navy also fathered the kite-balloon. In March, 1915, the kite-balloon ship "Manica" was sent to the Dardanelles and did good work. Other ships were converted as a result of her success and

a large organization grew up. At sea, kite-balloons were used chiefly with convoys for the detection of submarines. They were also developed for reconnaissance and spotting purposes with the fleet, but an opportunity afforded by Scheer's sortie in August, 1916, to test their value was not accepted.[1] In the early days of the War kite-balloon sections for work with the Army in France were supplied by the Navy, but in the autumn of 1915, the Royal Flying Corps became responsible for the supply of balloon sections for military work.

THE CREATION OF THE ROYAL AIR FORCE

It was very largely the supply problem which led to the creation of the Royal Air Force. Before the War the two branches of the air service had, to some extent, been co-ordinated by the Joint Air Committee over which the Secretary of State for War presided. But when war came the members of the Committee dispersed to their various duties, and the co-ordinating body ceased to exist just when it was most needed. The period of the Fokker predominance in France in the winter of 1915-16 disturbed Parliament and the public, and there was, even at this early stage, considerable agitation for a separate Ministry for Air. Public opinion, however, was ahead of the feeling in Whitehall, and Mr. Asquith met the situation by setting up a Joint War Air Committee, under Lord Derby, to co-ordinate the problems of aircraft supply and design.

The Committee, a strong one, was to be permanent, but, in fact, it lasted a bare two months. It lacked executive authority and could, therefore, do nothing to remedy such defects in the supply system as were revealed. It was Lord Derby's view that both branches of the air service should be amalgamated, but he expressed his doubts whether this step was practicable in war time. The Government decided to replace the Committee by an Air Board under the presidency of Lord Curzon, and this was set up in May, 1916. But as it still lacked executive powers the Board soon found it could do little to eliminate competition between the two Services. It was not long before there was an open breach between the Air Board and the Admiralty, and Lord Curzon and Mr. Balfour explored their differences in a series of coruscating and ironic memoranda.

Meanwhile the Government had been forced, by public opinion, to set up a Committee, under Mr. Justice Bailhache, to enquire into the administration of the Royal Flying Corps. In their final report,

[1] See "The War in the Air," Vol. II, pp. 418-9.

dated November, 1916, the Committee proposed that there should be one Equipment Department for both the air services.

Lord Curzon had already made a similar suggestion. When Sir Douglas Haig's request came for the provision of twenty extra fighting squadrons, the Air Board was confronted with the situation that there was no chance of meeting this demand from existing Royal Flying Corps supply sources. It was clear that the national resources must be organized as a whole and, in a report to the Cabinet, Lord Curzon had proposed the unification of the existing aircraft supply departments under the Air Board which would be solely responsible for design, supply, inspection and finance.

The problem was so serious that the Government could not further delay taking strong action and, in December, 1916, extended the powers of the Air Board so as to make it, in effect, a Ministry of Aircraft Supplies. The new Board held its first meeting in January, 1917, under Lord Cowdray. The Cowdray Air Board, which acquired the Hotel Cecil for its numerous departments, was highly successful and, by the end of 1917, could look forward to a surplus of aircraft above what was required for the defined needs of the Army and the Navy.

The Cowdray Air Board went part of the way, but not all the way, to satisfy public opinion, and the whole subject of the air service administration was again brought sharply to the fore in the summer of 1917. As a result of the two daylight aeroplane raids on London in June and July, 1917, when great casualties were caused, there was an outburst of public indignation and, within a few days of the second attack, the Prime Minister and General J. C. Smuts began an examination into the organization of the air services. Lord Cowdray's view was that an air staff would be necessary to deal with the surplus aircraft that would soon be available for operations. Sir David Henderson and many others stated the case for unification. In the middle of August, 1917, General Smuts submitted his report —a historic document—in which he advocated the establishment of an Air Ministry and the amalgamation of the Royal Flying Corps and Royal Naval Air Service into the Royal Air Force. The Government accepted the proposal and, in November, 1917, the Air Force (Constitution) Act was passed by Parliament. The first Air Council was formed in January, 1918, and the Royal Air Force came into being on the 1st of April.

When the War ended there were 30,000 officers in the Royal Air Force and 263,410 men, with 22,647 aircraft, and 103 airships. There were 274 aerodromes overseas and 401 in Great Britain, including

115 for home defence. The number of service squadrons totalled 185, of which 53 were at home, and there were nearly 200 training squadrons.

In France there was an Independent Air Force, formed in June, 1918, under Major-General Sir H. M. Trenchard,[1] for the bombing of centres of military importance in Germany. During its five months of existence the Independent Force dropped 550 tons of bombs of which 220 tons were dropped on enemy aerodromes. So greatly had Service aviation developed by the end of the War, that the Royal Air Force had become a national fighting force comparable to the Navy and Army.

[1] **Major-General Trenchard was succeeded in the command of the Royal Flying Corps in France by Major-General J. M. Salmond, in January, 1918.**

The Development of the Royal Air Force

By SQUADRON-LEADER J. C. SLESSOR, M.C., *p.s.a.*

IF ever there was a practical experiment in "disarmament by example" it is to be found in the history of the Royal Air Force in the years immediately following the Armistice. The return to normal conditions after the War naturally involved immense reductions in all three Services. At sea, however, the traditional British policy of naval ascendancy, together with the rise of other powerful navies, and on land the aftermath of war and the need for large armies of occupation to some extent put the brake on reduction in the sister Services. British air power, on the other hand—as apart from the comparatively few squadrons in India and in our other overseas garrisons—literally almost ceased to exist. This was perhaps inevitable. The Air Force had no peace policy nor tradition. The threat from the air, which had been largely instrumental in calling it into being as a unified Service, had disappeared with the disruption of the German Air Force, while the possibility of a similar menace coming from any other direction naturally then seemed inconceivable. In November, 1918, the British Empire had incomparably the strongest and best equipped Air Force in the world; there were 185 service squadrons, and our total strength exceeded 30,000 officers, 263,000 other ranks and 22,000 aircraft on charge. Within eighteen months from that date the Royal Air Force numbered 28 squadrons—7 squadrons at Home and 21 squadrons overseas—while our air striking force in Europe amounted to only 2 squadrons. On this basis of fighting strength the Air Estimates of 1920 provided for 3,280 officers and 25,000 other ranks, at an annual cost representing about a fortnight's air expenditure during the last months of the War.

A PERMANENT REGULAR SERVICE

The problem which faced the Air Ministry in 1919 was that of building up from the bottom a permanent regular Service out of the

ruins of our great war time air power. They had, at the same time, to provide for the widely scattered, if somewhat exiguous, air forces engaged in working in co-operation with the other Services, and also for various small campaigns, embers of the War, which were still smouldering in Russia, India and the Middle East. When it is remembered that all this had to be done with hardly any trained staff, with no permanent list of personnel, no permanent accommodation, and with obsolete equipment, at the irreducible minimum of cost, it will be realized that it was no mean task.

The foundation stone of the new building was a memorandum entitled "The outline of a scheme for the permanent organization of the R.A.F." (Comd. 467), drawn up by Sir Hugh Trenchard and presented to Parliament by Mr. Winston Churchill in December, 1919. This memorandum, in terms more biblical than are usual in official documents, compared the Air Force to the prophet Jonah's gourd. "The necessities of war," said the Air Staff, "created it in a night, but the economies of peace have to a large extent caused it to wither in a day, and we are now faced with the necessity of replacing it by a plant of deeper root." The principle on which the scheme was based was the reduction of service squadrons to the minimum necessary to meet our overseas commitments, with a very small force in the United Kingdom as a reserve; and the concentration of all the remainder of our available resources on perfecting the training of officers and men, the object being to lay the foundations of a highly trained and efficient cadre capable of subsequent expansion should the need arise. Next to the training of personnel, the strongest emphasis was laid on the extreme importance of supply and research, the responsibility for which was newly taken over by the Air Ministry from the Ministry of Munitions.

The scheme having been approved by Parliament, the work of organization and training began at the beginning of 1920 on the lines proposed. In the following two years the Air Force at home, apart from the few units necessary to meet the immediate requirements of close co-operation with the other Services, consisted almost entirely of schools and training units, maintenance and supply depots and the all-important experimental establishments. In 1920 the Cadet College, from which most of the permanent officers of the new Service were to be drawn, opened at Cranwell, while the training of the aircraft apprentices, who were to form the bulk of its highly skilled tradesmen, began at Cranwell and Halton. The Air Staff College came a little later, and the first course, which included officers from the other Services and from the Dominions, opened in 1922.

RELATIONS WITH THE NAVY AND ARMY

Thus were the foundations laid and the walls of the fabric gradually began to rise. The relations between the new Service and its older partners in the business of Imperial defence were, very naturally, not at first generally understood. The situation was, however, clearly defined by Sir Austen Chamberlain on behalf of the Government in March, 1922, in a statement of policy which has since remained the basis of those relations. Briefly, the position is that in the case of defence against air raids the Army and the Navy are to play a secondary role; and that in military operations by land or naval operations at sea the Air Force is to be in strict subordination to the General or Admiral in supreme command. In other operations, such as for the protection of commerce and attacks on enemy harbours and inland towns, the relations between the Air Force and the other Services were to be regarded as a matter for co-operation.

It was not long before an expansion, for which the original framework was designed, became necessary. The reduction of the British Air Forces after the War had not been matched by corresponding decreases in the air strength of other victorious nations. By 1922 this country was in a state of totally disproportionate inferiority in the air to her neighbours, and our complete defencelessness against the new form of invasion, a condition intolerable in itself, was bound to fetter our diplomacy even if it did not immediately threaten our national safety. It had been borne in upon us during the War that our historical insular security was in some measure a thing of the past, and in fact the establishment of the R.A.F. as a single Service in 1918 was largely the result of the insistent demands by organized public opinion for adequate protection against air attacks on our centres of population and industry. As a corollary, the conception had arisen of air power as a means in itself of enforcing national policy; not independent of others, but as one of the primary instruments, mutually interdependent, by which physical, moral and economic pressure is brought to bear upon an enemy in time of war. The word "independent," used in connection with Air Forces, has done a good deal of harm, and has even led in some quarters to the idea of the Air Council being "disposed to indulge in a little private filibustering, to engage in an aerial *guerre de course* of their own," which Lord Birkenhead once rightly described as fantastic. But air power as a factor in war is definitely something distinct, and requires for its correct and economical application a special study, special technique and, obviously, an adequate force of aircraft. This last was entirely lacking in 1922, and with the continued

existence of powerful air forces within striking distance of our shores that fact could no longer be ignored.

HOME DEFENCE

The first tentative step towards the restoration of the balance of air power between this country and other European nations was the adoption, by the Coalition Government in the summer of 1922, of a provisional scheme submitted by the Air Staff for the creation of a force of 15 squadrons for Home Defence. This decision, though it enabled the Air Ministry to put in hand the preliminary arrangements for expansion, was obviously quite inadequate to fulfil even the minimum requirements of security in the air. The next step was to come less than a year later. During that year the Government had set up a very strong Committee under the Chairmanship of Lord Salisbury, known as the National and Imperial Defence Committee, 1923, to enquire into the whole question of the correlation of the Services and the standard of air strength to be arrived at. As a result of this Committee's report, the Prime Minister in June, 1923, announced the decision of the Government to raise a force for Home Defence comprising, in the first instance, 52 squadrons. "In addition to meeting the essential requirements of the Navy, Army, Indian and Overseas commitments," said Mr. Baldwin, "British air power must include a Home Defence air force of sufficient strength adequately to protect us against air attacks by the strongest air force within striking distance of this country."

This decision has been endorsed and carried into effect by successive Governments in the last eight years, and forms the basis of British air policy at home. The date of final completion of the scheme has, for various reasons, been postponed on several occasions; but the organization of the air defences of Great Britain has gone ahead on the lines originally laid down; the 39 squadrons already in existence have reached a remarkable standard of efficiency, and the whole 52 squadrons with the corresponding ground defences are due for completion by 1938. Any subsequent development after that date—for which the organization is designed to provide—will have to be re-examined, to quote Mr. Baldwin's statement, "in the light of the then air strengths of foreign Powers." These last, it must be admitted, at present show no signs of decreasing, and our strength in first line aircraft at home is now about 38 per cent. and 44 per cent. respectively of the available strengths of the two most powerful continental air forces.

In accordance with the policy announced by Mr. Chamberlain in 1922 and quoted above, the air defences of Great Britain are under the command of an Air Officer Commanding-in-Chief, who also controls the operations of the anti-aircraft artillery and searchlight units of the Territorial Army, which form an essential part of the scheme. The air units, when the scheme is complete, will comprise 17 squadrons of fighters and 35 of bombers, of which the latter will eventually be organized into three geographical areas, and will include both light high-performance day bombers and heavy aircraft specially designed for operations at night. Purely passive self-protection, that is to say waiting for an enemy's attack and then attempting to repel it, has never been the British conception of national defence, and is peculiarly ineffective in the three-dimensional battlefields of the air. If proof is needed: in 1918 it took a force of 400 fighting aircraft, with 350 pilots, supported by training units comprising 227 aircraft and 165 pilots, successfully to defend this country against a German bombing force, the total strength of which was only about 40 aircraft, with of course the due proportion of training units behind it—an example of a successful diversion if ever there was one. It must, therefore, be apparent that to afford us any sort of protection against air forces that could now be directed against us, we should require a force of fighters immeasurably greater than we can afford to maintain in peace. And even then we should not be secure. So the policy is to provide the essential minimum of fighters for close defence in co-operation with the ground A.A. defences, and to concentrate the bulk of our resources on the maintenance of a formidable striking force of bombers, the positive proportion of the defences, to enable us to launch a counter-offensive if we are attacked.

One feature in the development of our Home Defence Air Force is especially notable. The original scheme provided for the inclusion in the striking force of a number of cadre and auxiliary squadrons, raised from the great centres of population and industry on the same lines as the Territorial Army. The raising of air units on a non-regular basis was frankly an experiment, and one which was regarded by many without much confidence. It has been an outstanding success. There are now 13 non-regular squadrons, and one of the most conspicuous features of the air exercises that were held in 1930 was the unfailing efficiency with which the non-regular officers reached their objectives in excellent formation, often under very adverse weather conditions, in aircraft maintained at a high standard of serviceability by non-regular N.C.O's. and airmen.

IMPERIAL AIR RESERVES

The protection of Great Britain against air attack is the primary role of the Royal Air Force in any European war. But we may find ourselves involved in a war in which the security of these islands is not threatened by attack from the air. In this event air forces will be required for operations overseas—either as the air contingent with a land expeditionary force, or in conjunction with the Navy to assist in the protection of their own bases or in attacks on those of the enemy, or as reinforcements to the air forces normally maintained in such places as Iraq or Aden. The Home Defence Force, in addition to its primary role, constitutes an Imperial reserve of air power on which we can draw for such eventualities. The training of the squadrons is adapted to fit them for such conditions in addition to the more specialized operations of Home Defence. In fact, the air exercises carried out in the summer of 1930 were designed to practice them in an operation of a class which they may some day be called on to undertake overseas.

Second only in importance to the provision of an adequate force for Home defence is the provision of the necessary air contingents for the Navy and the Army. The Trenchard memorandum of 1919 proposed the formation of certain units specially trained for this work. The organization has developed on these lines, though the strength, composition and basis of allotment of the co-operation units has been modified as the result of training experience and technical development. The Fleet Air Arm and the Army Co-operation squadrons are, in fact, to all intents and purposes arms of the Navy and Army, under the complete operational control of naval and military commanders, while the remainder of the Air Force constitutes a reserve on which to call for the support of the units definitely allotted for close co-operation.

THE FLEET AIR ARM

The most striking development has taken place on the side of naval co-operation. It is now a far cry from the day when the only air co-operation in the battle of Jutland consisted of a single reconnaissance by a seaplane for the battle cruiser squadron. There are now five aircraft carriers in commission, capable of accommodating a very large total of aircraft, while deck-landing, an operation which even at the Armistice was a hazardous adventure for the specially selected few, is to-day a commonplace of everyday training. The very great advance in the complicated technique of naval co-operation since the War has led to a considerable increase in the number of

units over the nucleus proposed in the Trenchard memorandum. The squadron organization was found not altogether suitable for the special conditions at sea, and the unit basis of the Fleet Air Arm is now the flight of six aircraft. Seventy per cent. of the Pilots and all the Observers are naval officers, in accordance with the recommendations of Lord Balfour's sub-committee in 1923. The Fleet Air Arm now comprises 25 flights, specially equipped and trained for the multifarious duties of reconnaissance and spotting, air fighting and torpedo attack, that may be required in a fleet action. Especially notable progress has been made in the torpedo work, and the results of peace exercises show a remarkably high percentage of hits. The aeroplane is probably the most effective form of torpedo carrier yet devised, and the torpedo-bomber flights of the Fleet Air Arm represent an immense accretion to the long-range striking power of the fleet.

In times of peace the flights embarked in carriers form a valuable mobile reserve of air power to meet sudden emergencies, such as that which arose at Shanghai in 1926, and to act as reinforcements for the air forces normally located in countries overseas, as in Palestine in 1929.

ARMY CO-OPERATION SQUADRONS

On the side of Army co-operation, the development, while not so spectacular as at sea, has nevertheless been steady and important. During the War a system grew up, notable principally for the importance of artillery co-operation. Within the rather narrow limits appropriate to the special conditions of static warfare, that system reached a high level of efficiency. But the Army to-day is training for a very different sort of war; mobility and mechanization are the watchwords, and although air observation for artillery remains of great importance, reconnaissance with a much wider scope, and the many difficulties of intercommunication and control in moving warfare have chiefly occupied the attention of those responsible for training the Army Co-operation Squadrons. On the side of material, the introduction of radio telephony as a means of intercommunication between air and ground has been an important innovation; new stereoscopic instruments have immensely enhanced the value of air photographs for survey purposes, especially for artillery. Now, for the first time in their existence, the Army Co-operation Squadrons are to be equipped with a type of aircraft at least equal in performance to any two-seater in the air, in the shape of the Hart. To-day there are five Army Co-operation Squadrons in England, one of which is allotted for training to each regular Division, in addition to those working for the Army in Egypt and India.

REGIONAL CONTROL

Overseas, the last ten years have seen the inception and gradual development of a completely novel function for the air arm. It was apparent in 1919 that the necessity for maintaining the new force superimposed on land and sea armaments involved a serious addition to the already heavy burden of defence expenditure. But the view was advanced for the first time that there are certain conditions in which air power can effectively be used as a partial substitute for the older forms of force, and thereby effect economies. Moreover, the acceptance of the Mandates in the Middle East had saddled us with the responsibility for the establishment of internal order in great areas of undeveloped tribal territory, in which it became our duty to replace the vanished rule of the old Ottoman Empire by a form of administration more suited to modern political conditions and to the aspirations of the people themselves. The Iraq rebellion of 1920 made it clear that to establish any genuine measure of administration based on the traditional methods of force, in countries of this nature, would involve the maintenance of garrisons on a scale which was impossible to contemplate under the prevailing necessity for economy. It was accordingly decided at the Cairo Conference of 1921 that, as an experiment, the Royal Air Force should be afforded the opportunity of proving their capacity to undertake a share in the ordinary responsibilities of Imperial defence in peace. The Air Ministry thereupon assumed responsibility for the establishment and maintenance of internal order in Iraq, on a system based on air power as the primary striking force to support the police and civil administration. This was followed shortly afterwards by the assumption of a similar responsibility in Trans-Jordan and Palestine.

This notable experiment was initiated at the end of 1922, when the position of Iraq, both as regards internal order in the tribal areas and in relation to her Turkish neighbours in the North, was one of considerable delicacy and danger. Immediate steps were taken to eject the Turkish irregular garrisons who were in occupation of large areas of Kurdistan in Iraq ; the tribes in the difficult Lower Euphrates area were brought under effective government control for the first time. The political situation in the country instantly improved. In spite of several considerable crises, such as the Turkish incursion into the Mosul Vilayet in 1924, and the Akhwan operations in the Southern desert in 1927-8, the occasions on which it was necessary to use force became gradually less frequent. This steady improvement in the situation has been reflected in a progressive decrease in the strength and cost of the Imperial forces maintained in the country ; and the realization of our policy of establishing the sovereign

authority of the Iraqi government, based on an Iraqi army, has been correspondingly hastened.

The "Iraq experiment" was an undeniable success, and achieved results which could have been obtained by no other means at any but prohibitive cost. It received recognition in a practical form by its extension to other areas where the conditions are similar. In 1928 the Royal Air Force assumed responsibility for the defence of Aden. Ever since the end of the Great War, the Imam of the Yemen had been in occupation of large areas in the Protectorate; and the first task of the Royal Air Force was to expel the Zeidi garrisons, to restore the tribal leaders with whom we had treaty relations and to re-establish British influence which in 1927 scarcely extended beyond the administrative boundary at Sheikh Otman. Five months intermittent operations by one squadron were sufficient to achieve these ends with complete success and at negligible cost. Our prestige in the Protectorate to-day is higher and our knowledge of its inhabitants more intimate than ever before. The hinterland is now being gradually opened up to commerce, while a loose form of administration by the development of roads, and by the establishment of a network of landing grounds in areas where no white man has been before, is being instituted.

So far the system rather vaguely described as "air control" has only been established at Aden and in the Mandated Territories of the Middle East. Elsewhere, however, there has been a growing tendency to make use of aircraft, both to check incipient disorder by immediate display of force, and to break down in the first instance the resistance of a savage enemy when disorder has come to a head. In the Sudan especially, a very complete system of landing grounds at all political and administrative centres, and the provision of float undercarriages for landing on the rivers, has made it possible for aircraft from the squadron quartered at Khartum to be on the scene of impending trouble almost anywhere in that immense territory within a few hours of their presence being required.

In India, the air forces, which are paid for and, of course controlled, by the Indian Government, were in 1919 stationed mainly on the North-West Frontier. The aircraft available were mostly primitive in type and of very low offensive power, and there was little past experience on which to draw for guidance in their employment in frontier warfare. The squadrons were almost continuously engaged in the third Afghan war and in the Waziristan campaigns of 1919-21. But apart from the bombing of Kabul, which undoubtedly had an important influence in deciding the Afghans in favour of peace in

1919, it cannot be said that air power had a truly decisive effect on the course of operations in those early years. In 1922 disaster overcame the Air Force in the form of an administrative blunder, which placed a financial embargo on all spares from the United Kingdom, with the inevitable result that by the end of that year there was literally hardly a single aeroplane in India fit to take the air. The consequent inquiry set on foot by the India Office resulted in important modifications in the system of control of the Service in India. The Air Officer Commanding was afforded direct access to the Viceroy, with control over a separate Air Vote in the Indian Budget, and the squadrons rapidly attained the respectable level of efficiency that prevailed elsewhere in the Empire.

From that date the same tendency, that has been noted elsewhere, to turn in the first instance to air forces in tribal operations, became increasingly evident in India. In 1925 the Commander-in-Chief authorized the first definitely air operation to be undertaken on the Frontier. It was a complete success and resulted in the unconditional acceptance of our terms by an important section of the Mahsuds, who had been consistently defiant of government authority and were virtually inaccessible to military action on the ground. Outbreaks of disorder among the Mohmands in 1927 and another section of the Mahsuds in 1928 were successfully dealt with by air action on similar lines.

The very widespread and serious disturbances in the summer of 1930 are perhaps too recent for them to be viewed in their true perspective. Yet it is possible that in the operations then undertaken to quell the tribes may be found a clue to the correct distribution of functions between land and air forces in this part of the Empire. The essential facts are that the duties of internal security on this side of the border and the close defence of important administrative centres such as Peshawar and Kohat were performed by the land forces; while the longer-range striking power, and the punitive force required to bring the insurgent tribes to submission, were provided by the air arm. In the four months from May to September the Royal Air Force was almost continually in action; about a dozen different tribal risings were broken in the early stages mainly by air action, and several were prevented by the threat of such action from coming to a head. The two serious Afridi incursions into the Peshawar district were finally repelled by air action combined with an active and vigorous close defence by the troops of the Peshawar garrison, although the air operations were affected by political considerations which did not permit their commencement at the most favourable moment. It can, at any rate, be said of the summer of 1930 that a situation on

the frontier which threatened to become more dangerous than it has ever been before, was satisfactorily cleared up, largely by the co-operation of air forces.

FUTURE DEVELOPMENTS

In general, the keynote of British air policy overseas is flexibility: the power to reinforce at short notice squadrons normally located in any particular area by others from neighbouring commands, based ultimately on a suitably situated reserve.

The Trenchard memorandum of 1919 drew attention to the importance of Egypt as a *place d'armes* for an air reserve in the Middle East. And the squadrons in Egypt to-day constitute that reserve for operations in Africa, the Middle East or India, in addition to providing the necessary air element for the defence of the Suez Canal in any war in which it may be threatened. From Egypt radiate the air routes to West Africa, the Cape, India and the Far East, in the development of which, for civil as well as for military purposes, the Royal Air Force have been the pioneers.

The flying-boat squadrons quartered at Basra and in the Far East are opening up the routes down the Arab coast of the Persian Gulf. Beyond Calcutta to Singapore, where a torpedo-bomber squadron forms part of the defences of the naval base, they will also do for the land side of the Singapore route what the squadrons in Egypt and Iraq have done for the routes in Africa and Arabia.

There is yet a long way to go in the direction of complete freedom of strategical movement for air forces. But progress is being made in the development of the routes themselves, in the provision of adequate heavy transport aircraft for carrying maintenance personnel and stores with the fighting units, in technical improvements such as heavy oil engines and emergency tankage for long-distance flights, as well as in the organization of meteorological and direction-finding services. Eventually there will be a chain of refuelling bases for land and sea aircraft, with at least nucleus air forces and stocks of ammunition, fuel and maintenance stores at important strategical centres, from West Africa and the Cape through Egypt and India to Hong Kong and finally to Australia.

GOLD MEDAL ESSAY (MILITARY) 1930

By CAPTAIN D. W. BOILEAU, R.A.S.C.

SUBJECT

"With the increase of mechanization the mobility of land forces over large areas will become increasingly dependent upon adequate supply systems.

Discuss the advantages to be gained by increased speed and range of manœuvre of mechanized forces in view of the limitations imposed by the necessity of organizing elaborate supply systems, particularly in regard to their operation in semi-civilized countries."

1. INTRODUCTORY.

IT may be accepted as an axiom that any increase in potential mobility makes a force a more efficient instrument in its commander's hands. But any plan of war based on theory without due regard to such restrictions as may be imposed upon it in practice, or not including adequate provision to meet them, starts with a handicap and will probably fail. It is, moreover, an easy matter to dogmatise on the advantages of increased mobility. The ideal, of course, is readily imagined; that is, a force proceeding rapidly to the crucial point, and there dealing its enemy a decisive blow. Yet unless adequate provision can be made for its maintenance in any probable situation, the plan on which it acts becomes impracticable. So it becomes imperative for the satisfactory execution of any military plan to make adequate provision for an efficient system of supply to meet the requirements of the force employed; and further to base that system on transportation methods capable of meeting all demands which can reasonably be foreseen.

In the history of war, maintenance long lagged behind, or barely kept up with, mobility. The motor gave it a lead which has since been counterbalanced by the adoption of the machine to give fighting forces greater mobility. Maintenance is thus once more in danger of falling behind. But if increased mobility is such an advantage, this must not occur. A means must be found of overcoming the difficulties, which will be proof against breakdown, while not depending for success on a too delicate adjustment of the movements of the transportation

system. Extended communications in front of railhead inevitably mean a multiplication of transport units, which results in greater difficulties of control and co-ordination. Where distances are great opportunity of correction is less, and so disaster may follow. It is necessary then to try and formulate a system, which shall eliminate as far as possible the risk of breakdown by simplifying control and organization, while ensuring the elasticity essential to a mobile force. It must also allow for the greater demands which may be made on it as mechanization develops. Nevertheless, for the present, it will be enough to take into account only those types of mechanical vehicles which are already in existence or projected while allowing for such probable improvements in design or material as might tend to an increase in speed and range of manœuvre. For mechanized forces so constituted the system of maintenance employed must be able to establish contact at least once in twenty-four hours.

The term, " mechanized forces," will be applied to all forms of such forces, armoured or otherwise, because we are still far from the stage when a whole army will fight in armoured vehicles. Armoured forces must then be regarded as one arm, whose co-operation with other arms is of the greatest value, but which remains on an equal footing with them, mutual co-operation being essential to success. Armoured forces have their own roles, according to type, and it is incorrect to regard them as able to carry out the roles of every other arm and act wholly independently.[1] It is evident, therefore, that they will rarely, if ever, be employed alone and without the active co-operation of cavalry, artillery, or infantry, singly or in combination. The proportion of armoured units will of course vary, especially in the case of a British Expeditionary Force, since it may be employed in such widely differing conditions. But the broad principles of their employment will remain unaltered.

The actual proportion of mechanized forces to the whole must, however, affect the problems under consideration. If mechanization is complete, the scope of the force will be wider, and it will possess an increased speed and range of manœuvre that can be subject only to limitations of maintenance. If, however, the bulk of the army is not mechanized, then the employment of the mechanized portion will be limited to some extent, owing to the necessity for co-operation between the different parts of a fighting force.

In present conditions, then, it is clearly impossible to put a whole army on wheels at the outset of a campaign, unless it be in a very small

[1] They are unsuitable, for example, for passive defence, and require protection from direct artillery fire by the action of other arms.

war. Accordingly, the state of affairs to be contemplated is, in the first place, that only a comparatively small part of the army will be mechanized, and that a full measure of mechanization would not be attained until the necessary output of material has become available. Any system adopted for the maintenance of the mechanized portion of the army should be elastic and capable of indefinite expansion so as to be applicable to the whole force, if and whenever completely mechanized. We need not consider the conditions obtaining when the radius of action of the mechanized portion of a force is limited by its having to conform to the movements of non-mechanized troops, nor in static warfare, nor in cases where mechanized forces form part of the protective detachments for a column of marching infantry and horsed artillery. The normal system of maintenance should prove adequate; and even when mechanized forces are acting with cavalry abnormal conditions are not likely to arise.

When a mechanized force, however, acts independently of non-mechanized troops, its movements will not be restricted and it may go beyond the normal reach of the supply echelons. Such a force would probably consist of armoured fighting vehicles of suitable type, infantry in omnibuses supplied with mechanized first-line transport and mechanized artillery, together with the necessary ancillary units. It is a mixed force of this type which will now be chiefly considered.

2. The Employment of Mechanized Forces.

The operations in which such a force is likely to be employed over large areas may be classified in two main divisions: (i) against a civilized enemy; (ii) against a semi-civilized or uncivilized enemy.

(i) The first may again be divided into operations in civilized and uncivilized countries; in the latter case operations may have features common to the second category. The chief characteristics for our purpose are that the enemy will operate on much the same lines as ourselves, will have an organized army, established communications, and modern appliances of war. Against such an opponent, in a war of movement, numerous opportunities for the employment of mechanized forces over wide areas and considerable distances will occur. Such forces will be employed for distant reconnaissance, in protective duties, on raids against the enemy communications, and as a mobile reserve. In all these activities increased speed and range of manœuvre would be of the greatest value, enabling a wider use and more rapid movement.

These advantages would be specially marked in a semi-civilized country, where lines of advance follow well-defined routes, and an army may be broken into widely separated groups. Thus, in the latter part

of the Mesopotamian campaign the Turks were split into three main groups, on the Euphrates, on the Tigris, and in Kurdistan, about 100 miles separating the various groups. The movement of troops from one to another was very difficult, and too slow to be of value in a crisis. Our own situation was similar but perhaps easier.

A mobile mechanized force would have been of the greatest value to both commanders for reconnaissance, raids on enemy communications, while it would have been invaluable as a mobile reserve; the faster and further it could go, the more useful it would have been. Thus a sudden threat of an attack on the Euphrates front might have obliged us to withdraw troops from our Tigris front, so weakening us on the line of our main advance. Progress there would have been retarded, and a rapid movement of enemy mechanized forces for use against us at that point might have resulted in at least a temporary reverse. Again, if one commander had possessed such a force, the other could scarcely have given effective protection to his communications on either river, and retirement would have been almost inevitable. Assuming, with greater probability, that both had such forces, the country N.W. of Baghdad might well have become the scene of a war of manœuvre.

In a civilized country, there may often be greater facilities for delaying a pursuit. The country may be such as to oblige mechanized forces to keep mainly to the roads, where blocks and demolitions can be used to that end. This would also be true of a semi-civilized country where cross-country movement might be largely impossible, as for instance on the North-West Frontier of India. Such action is, however, rarely possible in a country of infrequent defiles and no roads. Our pursuit of the Turkish army after the capture of Kut in 1917 could not have been delayed in this way, and was only impeded by the impossibility of maintenance at such a distance. The action of mechanized forces might have made the rout complete instead of partial, and the farther and faster they could go, with due regard to adequate maintenance, the more certain would this have become.

In semi-civilized countries, where water supply is often a problem, mechanized forces will be specially valuable for such tasks. Where the route lies over waterless desert non-mechanized troops either cannot operate, or elaborate arrangements for water are necessary. This might be the case with mechanized forces, if the desert journey were prolonged, but the quantities required would be much less than for cavalry, and, as far as vehicles are concerned, consumption can be materially reduced by the use of suitable appliances. In Mesopotamia, in October, 1918, the cavalry was obliged to go round the Turkish left flank at Fat-ha,

movement round the other flank being impossible for cavalry since the route would have lain over waterless desert. As a result, it had to cross two rivers, and special arrangements had to be made for water en route. On the right flank, there were no such obstacles, and the rising ground west of the Tigris would have afforded better positions. As it was, only the few armoured cars with the force were able to act on the enemy right flank, and did so with considerable success.

Improved capabilities of speed and range of manœuvre would undoubtedly lead to the use of mechanized forces in long-distance raids, or at least to a serious consideration of their practicability where conditions appeared favourable. Already in October, 1918, a cavalry raid was considered from Mesopotamia up the Euphrates to assist Allenby's cavalry, which might be pushed on to Aleppo. From railhead in Mesopotamia to Aleppo was 350 miles, and the cavalry might well have been required to cover the whole distance. To have been of effective assistance they must at least have covered the greater part of it. Had mechanized forces then been available, such a raid might have been suggested much sooner. It would not be sound, therefore, to exclude such a movement from our future calculations.

In this instance, the ruling factor was reported to be transport, of which insufficient was available, this being always the chief consideration in such cases. The vulnerability of prolonged communications, and the danger of isolation, might rarely cause such an operation to appear tempting. It might, however, be that such an attempt was judged expedient, though this would be more probable in a semi-civilized country, since in a civilized country there are better means of communication enabling counter measures to be taken more rapidly. The quicker the movement, therefore, the greater the prospect of success, leaving out of consideration all attendant difficulties, as well as the basic question of the intrinsic value of such a raid.

For present purposes, such an undertaking must be regarded as within the realm of practical politics, and as presenting a potential supply problem.

(ii) The principal characteristic of operations against a semi-civilized or uncivilized enemy must be that he will generally be unorganized, without definite communications, and lacking in modern equipment, especially aircraft, armoured forces, or means of defence against these. His strength will lie largely in his extreme mobility, enabling him to elude a force hampered with the impedimenta of civilization. Anything tending to reduce the odds, therefore, will be an advantage. If mechanization makes a force more nearly ubiquitous, as the enemy may often seem to be, any additional gain in this respect will be greatly

to the good, while the moral effect of a rapid appearance at a considerable distance must prove very great. The arrival of an armed force on the spot, at the earliest possible moment when trouble is threatened, may quell an insurrection before it has assumed dangerous proportions.

In such a campaign, operations often consist in the relief of small posts, the rescue of officials or prisoners, the re-opening of communications, or the infliction of punitive measures. Prestige must suffer through failure, or even protracted delays, since waverers are encouraged to think insufficient force is available to overcome rebellion. The objectives may be widely separated. In the past, much valuable time has often been expended, and other pressing operations delayed or prejudiced, while a marching column has been organized, the components of which must be collected from wherever they can best be spared. They must then concentrate and advance several days' march to their objective. Where the use of mechanized forces is practicable the process will be very much quicker and more economic.

The operations in South Kurdistan in 1920 provide a comparison. The insurrection started in Sulaimaniya, and a small mechanized force was defeated. A column was formed, and meanwhile the revolt grew. Troops from the Tekrit-Sharqat area marched to Kirkuk, thence to an advanced base, in all some eight days' marching. Thence it was still three days to Sulaimaniya, or eleven days' marching alone. Making every allowance for bad roads, heat, and other considerations, an adequate mechanized force might well have covered the 150 miles from, say, Tekrit, in three days' running time. The sooner it could arrive, the more effective it would have been. Moreover, such a force could have been kept in reserve as a mobile striking force at, say, Tekrit. Thence it could have proceeded in any of several directions where it might have been needed. Mosul was within 150 miles, Baghdad and the Upper Euphrates less than 100. Increased speed and range of manœuvre could enable such a force to be retained in a central situation and be moved rapidly to a vital point.

Advocates of the control of territories, such as Iraq, by the Royal Air Force may argue that the latter is able to do such work much more quickly and efficiently, being still more mobile and capable of greater concentration; and that the use of ground forces, mechanized or otherwise, is superfluous. There still appear to be differences of opinion on this subject, and while this is so, such operations must be regarded as within the possible scope of employment of ground forces. In addition, there is always the possibility that the Royal Air Force may be unable to act owing to lack of landing grounds, or some other sufficient reason, and that the duty will fall to the Army.

3. Considerations affecting Supply.

Having considered the operations in which increased speed and range of manœuvre will be advantageous, the supply situations arising in connection with them may now be examined.

What are the probable distances over which supplies will have to be carried to the mechanized forces from railhead or other source of supply? Apart from the long-distance raid, which may be studied separately, it does not seem probable that these would often exceed 160 miles at most. The campaigns in Palestine and Mesopotamia do not disclose any situation where any useful purpose would appear to have been served by more distant action, even with mechanized forces; often it would have been less.

Before Kut fell, in 1917, much less would have permitted effective action against the Turkish communications; even Baghdad was within the figure. Deraa, the Turkish railway junction in Palestine, was less than 150 miles from Jerusalem. The cavalry movement at Fat-ha, already described, was only 100 miles, and was quite enough; even if prolonged to Mosul, this was only 160 miles from railhead by either bank of the river. The distance between the groups of the two armies on the Euphrates and Tigris was but 100 miles. Whether needed for distant reconnaissance, turning movements or special missions, in operations against a semi-civilized or uncivilized enemy, this radius of action from railhead or other supply base will generally be more than enough. In Iraq, for example, that distance from the railway, as it is at present, would cover the whole country as far as it is practicable for the operation of mechanized forces.

It is, therefore, suggested that about 150 miles may reasonably be taken as a basis, when discussing the supply of mechanized forces operating over large areas, as the normal maximum daily run-out from the supply base. While, however, this might be the case in favourable conditions, the same distance might take three days to cover in conditions less favourable. Even if armoured fighting vehicles can get over the ground to be encountered, the capabilities of their transport, both in "B" Echelon and behind, must receive consideration. Those echelons have not as good a cross-country performance, and consequently supply at 150 miles distance might be as difficult as at a much greater distance in more favourable conditions. The lorries working from Jericho to Amman, in the last stages of the Palestine campaign, could only average forty-eight miles a day in fifteen hours running time. This is of course exceptional, and, in favourable conditions, i.e., on good roads in a temperate climate, nearly 100 miles a day might reasonably be expected from the supply echelons without need for change of drivers. On the

basis that a distance equal to a full day's run for one echelon must be shared by two echelons for continuous working, it may be taken that, in good conditions, the maintenance of a force distant 100 miles is within the capacity of the normal system. Over that distance, the echelons will require to be augmented, which will also be the case in bad conditions when the normal day's run is reduced.

In a semi-civilized country, where roads are bad or non-existent, this will often occur, and it will be found that about sixty to seventy miles will be the normal limit for regular working. A very extended line of communication in such circumstances will therefore demand an exceptional amount of transport, which would as a rule make the long distance raid impracticable except in very favourable conditions. The transport estimated to be necessary to maintain a force of a regiment of cavalry, a battalion, sixteen armoured cars and three aeroplanes, at Hamadan in 1918, was seven M.T. companies, the distance from railhead being 260 miles. It may therefore be taken that a mechanized force may require to be maintained, as a normal condition at a distance from railhead equivalent to a day and a half's run-out for the supply echelons in favourable conditions, or up to three days' run-out in adverse conditions, i.e., the echelons of transport required for maintenance will be from three to six.

The problem presented by the distance from railhead is further complicated by the possibility of lateral movement, which will add to the distance run by the supply echelons, as they will have to keep up with this, as well as going up and down. In a country of great distance, such movement might well occur to the extent of a day's radius of action of the force, and at the same distance from railhead, e.g., in the early stages of a campaign when the enemy was being sought. Where movement is restricted to definite lines of advance this will not have to be considered, but wherever it is liable to occur provision must be made for it, or the free movement of the force will be impeded and its mobility prejudiced.

Lateral movement might also occur in operations against a tribal enemy, where objectives are scattered, and particularly where the available force is none too large. In such a case, it may be expected that mobile forces would be worked to the full extent. Increase of speed and range of manœuvre would tend to multiply the demands on them.

This leads to another aspect of the effect of increased speed and range of manœuvre on the supply situation. Presumably these imply that armoured fighting vehicles, in particular, will be capable of more continued effort and act more often in a given period than now, striking possibly daily instead of at intervals of one or more days. Mechanized

forces will be more active, more use will be made of the vehicles. The more they can do, the more will be expected of them, and to-day's maximum tends to become to-morrow's normal and the minimum of the day after. Increased work at higher speed will tend to quicker deterioration of engine and chassis, which will in turn again increase the consumption of petrol and spare parts. Increased speed of a motor vehicle means, generally speaking, higher consumption of petrol and lubricants. Improvements in design tend to reduce this, but not greatly, and more can be done by care and skill in driving and maintenance.

The fact remains that one of the principal effects on the problem of maintenance will be an increase in the bulk to be carried, i.e., more transport will be required. While this does not in itself complicate the supply organization, it bears directly on the general question of the supply of a mobile force. The question may be summarised as follows :— delivery will be necessary at greater distances, possibly complicated by wide lateral movement, and the quantity of vehicle requirements will be increased.

4. Considerations of Transport.

Various considerations affect the solution of this problem. As already shown, the distance to be covered is relative, depending on the nature of the route and the time taken for the journey. Every mile further that the force goes means two miles extra running for the echelons in rear. To overcome this, either the lorries must run further in the day, or additional transport must be provided.

(i) In the first alternative, there are several limitations, viz., (*a*) tactical conditions, (*b*) powers of endurance of drivers, and (*c*) the economic daily mileage of vehicles, i.e., the maximum distance they can run with due regard to necessary inspection and oiling. Of these (*b*) can be overcome by change of drivers, but (*c*) is definite. Allowing twelve hours a day for the normal run, and three more for care of vehicles, a change of drivers will give a 75 per cent. increase in running time and consequent daily mileage.

Tactical conditions will result in various restrictions on free movement. These might be due to enemy aircraft making movement possible only at night ; to a need for secrecy ; or, where the whole line has to be protected to allow of the safe passage of convoys. The last applies particularly in a semi-civilized country, e.g., the North-West Frontier where picquets are necessary. In such conditions, movement at night is impracticable, as protection on the road cannot be guaranteed, and vehicles must be in a perimeter camp. Daily mileage will be limited by the number of hours the route is kept open. If the route is a regular

one, there may be standing picquets, and traffic can then run all day. If, however, the route is not regular, or standing picquets are undesirable, there will be more loss of time to allow the picquetting troops to get into position. Where the country allows the use of escorts instead of picquets, movement will be by day only and limited to convoys. Isolated vehicles are then unable to proceed, unless the route is patrolled, which might often be inadequate against an opportunist enemy.

Such systems as the normal ammunition supply, or the "endless band" petrol supply, with vehicles running up and down singly or in small groups, are then either limited to daylight working or are unworkable in their true forms. Where this occurs, alternative systems must be organized in cases where the necessary refill must be constantly available. The delivery of rations, once daily only, is not affected quite as much, but all are equally limited to a definite daily running time.

(ii) The second alternative is to increase the carrying capacity of the transport echelons. Either larger or more vehicles are necessary.

In the first case, it has to be remembered that the Army has to use the type of vehicle employed in civil life. On mobilization, 90 per cent. of transport vehicles will be standard commercial lorries, 30 cwt. and 3 or 4-ton, these last carrying the same bulk. Road trains are also ruled out, not being in common use; even so, it is doubtfull if they would be suitable for active service conditions. Convoys of them have been found unwieldy, and thus are particularly undesirable where roads are narrow, and it might be necessary to reverse quickly. Even if road trains are used, they only solve part of the problem, that of carrying most bulk in the shortest road space. which is always desirable, long trains of transport being difficult to control and defend, also liable to cause congestion.

If the bulk to be carried will increase rather than decrease, any development tending to reduce the number of vehicles necessary will be an advantage, subject to the type of vehicle being suited to service conditions, and to the necessity for the form of transport being elastic in use, i.e., able to deliver at scattered points. The type of vehicle will not affect the system, and all will be subject to the same limitations as regards mileage. The fact remains that, if the distance over which supply has to be maintained is outside the range of the normal echelons, whether this is extended by change of drivers, or is limited by other factors, additional echelons will have to be provided to maintain supply.

At present, these are found in the Reserve M.T. Companies. Experience shows that a transport reserve is essential, since mobility has often been attained only by immobilizing part of a force, e.g., in Palestine, when a division was deprived of its transport to enable the

forward movement of the main force. Again, mobility has often suffered from lack of transport. Pursuit after the fall of Kut in 1917 was temporarily stopped as it had outrun our communications. With more transport available it could have continued proportionately longer.

The conclusion is that mobility depends on adequate transport for the realization of its full measure. Accordingly, if a highly mobile force is starved of transport, it cannot fulfil its proper role. Moreover, it will not be enough if the transport is only available when not needed for anything else, i.e., if the needs of a mechanized force have to be balanced against those of other portions of an army in the field. It should be definitely allotted to that force, and only considered as available for other needs, when it is quite clear that it is not needed for its proper purpose, without undue increase of the total transport. But, as shown, increased speed and range of manœuvre will almost certainly result in a wider use of mechanized forces, which, in suitable conditions, is liable frequently to lie outside the radius of normal supply.

As an example of what may occur take such an operation as is contemplated in the official instructions[1], a mechanized force employed in an independent role involving "a long movement up to the full capacity of the force to maintain itself for forty-eight hours." Suppose the force starts 50 miles from railhead, and goes 100 miles out, returning next day. It will have supplies for the first day on the man or in cookers. Those for the second day will have to be delivered on the first evening, so the supply lorries will have to follow sufficiently closely to do this, while petrol and ammunition lorries will have to run right out. If they can run at night, they can return part of the way with relief drivers. Otherwise they will have to stay with "B" Echelon overnight. It will not matter either way, if the force returns to its original starting point on the second day or other point within reach of the Maintenance Company, which can then deliver direct. If the force does not return the whole way, but only, more probably, withdraws part of the way to concealment, perhaps still 100 miles from railhead, this would be beyond the Maintenance Company's normal run.

Even if the supply lorries had returned to a point at which they could meet that echelon, they could not deliver the same night, as this would mean running 250 miles in thirty-six hours. This could be reduced if the Maintenance Company did an extra long run of some 75 or 100 miles out. But it would be quite impossible to keep this up indefinitely, and an extra echelon would be necessary on the third day. If the force were then moving again, it would have to remain to maintain

[1] Vide JOURNAL OF THE R.U.S.I., February, 1929, p. 41.

supply. It would thus become practically a normal link, especially where the second-line lorries could not return by night, and the third line had to make an extended run. The mobile force must not have to return to any fixed point, or even a definite distance, to enable supplies to reach it, but the supply organization must be able to deliver wherever the force may be. Otherwise a restraint will be placed on mobility.

This applies equally to petrol supply, with the addition that the organization must ensure sufficient always being available to maintain mobility. To achieve this, the system called the " endless band " has been put forward. This consists in the petrol-carrying lorries being organized in three echelons, one at " B " Echelon, the second at about the normal distance of the Divisional Supply Company, and the third level with the Maintenance Company. As lorries in the first are emptied, they return direct to railhead to refill, and are replaced by an equal number from the second, completed in turn from the third. Refilled lorries join the third echelon. Delivery is direct to vehicles in "A" Echelon.

The essentially long runs are made possible by exchange of drivers. Where, however, the run is limited by the number of hours in the twenty-four during which traffic is possible, the system would be slowed down but could still work. The echelons would have to be proportionately stronger, as lorries could not either return to railhead or come up again so quickly. The system allows, for a Medium Armoured Brigade, six medium lorries in " B " Echelon, eight in the second and ten in the third. These would carry thirty, forty, and fifty miles respectively for the whole Brigade, 120 in all, or rather more than a full refill and can maintain supply up to a maximum of 100 miles from railhead in favourable conditions and where continuous running is practicable. In times of stress, it requires the help of additional transport drawn from Reserve M.T. Companies.

Similarly, ammunition supply may require special arrangements when the force is beyond the normal radius of the ammunition echelons. The expenditure of ammunition, however, is not likely to be so great in the mobile operations of a mechanized force as in warfare of a more static nature. "A" Echelon of an armoured brigade carries a normal day's ammunition, and there is a day and a half in the echelons in rear, a good margin. There is not likely to be so much need for additional transport, as there will be more time for lorries to return to refill, but it may arise when there is considerable fighting, and movement is restricted. Occasional interpolation of an extra echelon in exceptional circumstances will probably be enough ; but the normal system will not need alteration, being elastic enough already. Lorries can go forward to refill, or run straight through, as occasion demands.

In each case, supplies, petrol and ammunition, there is a common consideration affecting the organization of their transport echelons, i.e., the mixture of detachments from different transport companies which is sure to arise. This is liable to be specially marked in warfare in a semi-civilized country. When a column is sent out, it is often found expedient to make it up from different formations, as the units can best be spared. The composite group has a quantity of transport drawn from the respective formation transport companies. This creates a difficulty not so great in animal transport days as now with mechanical transport. The various companies from which the transport is drawn may be composed of different makes of lorries, grouped therein for convenience of working, and provision of spare parts will be very much complicated if a number of different makes are combined to form one body of transport.

For example, suppose a mechanized force consists of a Medium Armoured Brigade, an Infantry Brigade, an Armoured Car Regiment, an Army Field Artillery Brigade, an Omnibus Company to carry the infantry, and ancillary troops. The Medium Armoured Brigade transport is, according to " Mechanized and Armoured Formations," supplied by the Divisional R.A.S.C. This presumes that the Brigade forms part of a division ; but we do not seem to have reached that stage yet, and transport is more likely to be supplied by G.H.Q. or Corps Troops M.T. Companies at present. The Armoured Car Regiment would have lorries from Cavalry Divisional R.A.S.C. ; there would be lorries from the Infantry Brigade section, and possibly the Divisional Troops section, of Divisional R.A.S.C. ; the Army Field Artillery Brigade section of G.H.Q. Troops Maintenance Company ; and other detachments from the latter and Corps Troops Maintenance Company.

The force may be completely detached from the Corps and Division to which most of it belongs ; and there will be, for both supplies, ammunition and baggage, three whole sections, plus detachments of others, without headquarters or workshops. In operations against an uncivilized enemy, a force such as this is quite likely to be the largest formation employed on any given operation, tending probably to become a normal formation, being of convenient size for most purposes. This mixed body of transport will therefore tend to be constantly with the force. Behind it will be a third line, composed of detachments from corresponding Maintenance Companies, also separated from their headquarters and workshops.

Besides these, there will often be lorries of the Reserve M.T. Companies, brought in to act as interpolated echelons in the case of supplies, or as additional transport for petrol or ammunition at stress periods, which

will be similarly situated. It would be an evident advantage if all these could conveniently be organized under a unified control, preferably as independent Supply, Baggage and Ammunition Companies.

5. A Suggested Organization.

A necessary preliminary to the planning of an organization to suit the conditions outlined is to know the load to be delivered. From this, the transport required can be calculated. For the present purpose a force as already described may be taken as a convenient basis.

To consider first the question of supplies and petrol, the quantities, in terms of light (30-cwt.) lorries, are as follows :—

Formation.	*Supplies, daily.*	*Petrol and lubricants, per 100 miles.*
Medium Armoured Brigade ..	7	38
Infantry Brigade, and Omnibus Company	10	18
Army Field Artillery Brigade ..	5	6
Royal Engineers, etc., say ..	2	2
Armoured Car Regiment	4	4
Total	28	68

Now, in the situation set out above, a movement lasting forty-eight hours, the whole of this will have to be delivered on the first evening. " B " Echelon is big enough already, with some 280 vehicles occupying roughly six miles of road. Nothing else should therefore be added to it. The supply and petrol lorries should not therefore join it, but march separately in rear, not so near as to impede, but still able to get up easily at night. Their numbers may be reduced by half, if medium lorries are substituted for light. In the case of petrol, this is proposed in the " endless band " system, and presents no difficulties. In regard to supply lorries, if it is taken into consideration that unit first-line transport will normally be brigaded at " B " Echelon, and that there will thus be practically only one delivery point, there seems to be no reason why supplies should not be carried there in bulk and broken there.

The systems for supply of rations, petrol and ammunition, each require at least two groups of lorries at intervals between " B " Echelon and railhead. In a European theatre, these would be protected to a large extent by the general measures of defence of the areas in which they work against attack by aircraft or armoured fighting vehicles. In a semi-civilized country, they would have to be protected more

closely, as small isolated groups might otherwise be rushed. Besides the transport mentioned, there would be various other units of sorts e.g., baggage companies, ordnance workshops, medical and engineer units. Each commander is, of course, responsible for the protection of his command, but the defence of the area will have to be co-ordinated; and, in a semi-civilized country especially, where a perimeter camp must be formed at night, all units will have to be collected for the purpose.

There will then need to be a commander definitely appointed in each area to co-ordinate defence, and he must have a staff, and means of communication. Thus there would be two or, if communications are extended, possibly more bodies between "B" Echelon and railhead, each under its own commander. Some components would be permanent, others constantly going up and down, in the work of supply or evacuation. Where movement was free at all hours, they would form convenient positions for such groups as petrol and ammunition echelons. Where movement was only possible by day, they would form halting points for the night for moving echelons. As an additional advantage, this would reduce the number of points with which communication has to be maintained. Communication by motor-cycle is slow compared with W/T, and may be impracticable in a hostile country, while if every unit had a W/T set there would be confusion. The commander of each group should therefore maintain communication with other headquarters, and transmit orders to units in his group; and he would be responsible for moving the group to correspond with the movements of the mechanized force.

These groups may, for convenience, be named "C," "D," and "E" Echelons respectively. It is suggested that they would lie, in a line of communications 150 miles long, in favourable conditions, about 25, 65, and 115 miles in rear of "B" Echelon respectively, for the following reasons:—

(i) Petrol lorries from "D" Echelon could, if necessary, run to "A" Echelon and return to "C" without change of drivers, and halt there overnight if necessary, or continue with new drivers.

(ii) "D" Echelon would be one day's run-out for columns from railhead, which would halt there overnight, going on to join "C" Echelon next day.

(iii) Lorries returning to railhead would not always be able to get right through, and "E" Echelon would be a convenient halting-place. Returning empty sections would be directed here to the railhead or dump at which they were to refill. In a shortened line of communication this echelon might be in the dump area, if such were established, or near railhead.

(iv) The comparatively short runs from "D" to "C," and thence to "B," Echelons, would allow for lateral movement amounting to almost a day's run in extreme cases. This would however affect the rearward less than the forward echelons, as the former would move across on the chord of a circle of less circumference, railhead being the centre.

To maintain supply at the end of a 150-mile line in such circumstances, it will be found that a total of four transport echelons will be necessary. It is suggested that these should run as through convoys from railhead to "B" Echelon, passing from one group to another each day.

Each Supply echelon would consist of about eighteen medium lorries, a number covering administrative units, stores, etc., and each would form one section of the mechanized force supply company. The petrol lorries would similarly form sections of about eighteen medium lorries each. Two of these would be able to maintain the "endless band" in conditions favourable to its use, i.e., where day and night running were practicable; but, where this was not the case, there would have to be double the number, to enable a complete refill to be delivered every day if required. There should therefore be four petrol sections.

This establishment would meet the case if a Cavalry Brigade were substituted for the Infantry Brigade in omnibuses, reduction in petrol being counterbalanced by increase on account of hay. It would meet the case if a Light Armoured Brigade took the place of a Medium Armoured Brigade.

As regards petrol supply, there would be no need to interfere with the proposed "endless band," where conditions permitted its operation in its true form. Since petrol should be delivered direct to vehicles, the lorries carrying it have farther to run than those carrying supplies or ammunition. They must return at least to "B" Echelon after delivery, and their position prior to going up has therefore to be considered in this light. The principle of petrol supply is that there must always be a necessary refill readily available. Consequently there must always be enough lorries within reach to satisfy demands, which may vary from little to a complete refill, and they must be near enough to be able to go up, deliver and return within any time limits which the situation imposes. If refilling is only possible at night, they must be able to go up, deliver and return within the hours of darkness. Season will be a factor here, but the maximum distance would be forty miles each way. A certain number of lorries will only have to go as far as "B" Echelon, to replace or refill empty lorries there, and these could start from farther back.

There should however be a complete refill for "A" Echelon not more than forty miles back, i.e., at "C," and enough at least to refill "B" Echelon at a convenient distance in rear, i.e., at "D" Echelon. Where movement is only possible by day, the distances will be much the same as for night working, the time available being about equal. Only those lorries necessary to complete the quota of the echelon in front would go forward each day.

Ammunition would require to be dealt with similarly, whether on a through system or with transference of loads; but a separate company should be organized as for supplies, and this also applies to baggage.

As regards supplies, bread and meat in particular might call for special consideration, especially in a hot country, and through lorries might have to be run, or special vehicles provided.

The objection that will probably be taken to the suggested organization, which is a normal form of convoy over an extended distance, is that to have special companies for the mobile force involves the immobility of a mass of transport, when the force is not so far away, or is not likely to move laterally, or is only going out at intervals for not more than forty-eight hours at a time returning then to its starting point.

The answer is that, in such cases, the transport will always be available for other duties, such as would be performed by Reserve M.T. Companies. The latter consist of fifteen light and seventy-five medium lorries. The suggested organization of a Mechanized Force Supply Company requires about 144 medium lorries. The allowance of transport, on the present scale, for the component parts of the force, taking second and third line transport together, amounts to some sixty-five medium lorry units. The whole of a Reserve Company might therefore be required at any time to make good the deficiency. It ought therefore to be constantly available, and so might as well be definitely allotted for the purpose. One unit would therefore be saved, i.e., a Reserve Company. The proper second and third line transport of units temporarily forming part of the mechanized force would be available for other duties nearer their parent companies.

The Mechanized Force Supply, Baggage and Ammunition Companies would be complete and homogeneous units, and there would be a considerable gain as a result in improved working, consequent on more efficient supervision and better maintenance.

Again, while the distance might be less than 150 miles, it might be relatively as far, owing to difficulties of the route, making progress slower, and the same number of echelons would be needed.

Spare lorries might often be required for carriage of tentage or material, and the Mechanized Force might often be able to find these from its own transport.

The transport serving a mechanized force will be liable to greater strain, owing to the possibility of exceptional calls being made on it, whatever system is employed. This will apply to both men and vehicles. There will therefore be more need for a margin to allow of men getting their proper rest and the vehicles being subjected to periodic overhaul, without which they will rapidly deteriorate and become unable to maintain the required service.

If more economical forms of transport than the six-wheeled lorry, but equally efficient, are introduced, it would not involve any change in the system. The sections would be made up of a suitable number of vehicles working in the same way. If trailers were used, it might be found more convenient to transfer them from one tractor to another at intermediate stages. The petrol-tank-lorry could also fit in, and would perhaps be most conveniently placed in the rearward echelons, as a sort of advanced mobile dump. In this case, a section of them might be substituted for one can-carrying section, the others carrying on the " endless band " forward from it.

The organization would be adaptable to the needs of the force in operations against a semi-civilized enemy. There would probably be an extended line of communication required for at least several days. Once the objective was reached, there would usually be a period of reduced activity on the part of the force as a whole, portions of it, however, carrying out minor operations in the vicinity. The lorries of the petrol sections thus released could be used to supplement supply sections if necessary, or to maintain the columns sent out.

The through system would be an advantage where picquetting was necessary, as it would avoid the delay due to transfer of loads. There is also the advantage, where the supply of native troops is concerned, that bagged goods, such as atta, suffer by constant handling, and loss would thus be minimized.

It has the precedent of being the system adopted for the supply of the Cavalry Division before the Great War, when supplies were carried through from railhead to first line transport by sections running on alternate days. As these were mechanical transport, they were able, at least in a European theatre of war, to maintain supply since cavalry were unlikely to outrun them.

Should the normal system of refilling be preferred, this could take place at " C " Echelon, one section consisting of 30-cwt. lorries working regularly thence to " B " Echelon.

There will always be three days' rations in advance of railhead, thus allowing an extra margin over the two days maintained for other troops.

As regards the more distant employment of mechanized forces beyond the range of the suggested system, it would not be necessary to interfere with the latter. A movement to a greater distance than 150 miles will be abnormal and will require considerable preparation. A reserve of supplies, petrol and ammunition will have to be worked up as far forward as the situation permits, which would reduce the distance for the maintenance echelons. Thus in the case of the projected raid up the Euphrates, to which allusion has been made, this dump might have been at Haditha, 100 miles from railhead. Thereafter, another dump might have been made at Dair-es-Zor, 150 miles from Aleppo.

It is thought that such intermediate posts would be unavoidable, since the line of communication must be defended, and centres would be necessary for the troops so employed. Workshops would be essential to deal with the wastage inseparable from so distant a movement, and temporary hospitals would also be necessary. Two posts on a line 350 miles long would not gravely interfere with the mobility of the force; the supplies, etc., would be put into them with any transport available; in the instance already given, river transport might possibly have been used.

Unless a properly organized line of communication can be established and protected, such movements, and even much shorter movements, will be quite impracticable. The only alternative is to put the line of communication into the air. Even that would depend on at least local command of the air for its success. Besides, when one considers the quantity of supplies and petrol involved, it seems hardly probable that there would be sufficient aeroplanes available. The Medium Armoured Brigade alone requires 12,000 gallons of petrol to move 100 miles. It is understood that a Vickers-Victoria aeroplane can carry at most, with a special tank fitted, 1,000 gallons. It would take twelve of these machines, eight hours flying to deliver the full quantity at 350 miles distance. Shorter distance would, of course, reduce the number; but when rations, ammunition and other essentials are added, it seems that a considerable number of aeroplanes would be needed in any case, and it is a question if they could be spared from other duties.

It is not, of course, suggested that this method of supply would not be of the greatest value in an emergency, as for instance if the transport were unable to get forward on account of floods.

7. Conclusion.

To summarise the conclusions reached. Firstly, mobility is an eminently desirable quality in an army, and anything tending to produce or improve it is an evident advantage. These facts are applicable in a specially marked degree to a mechanized force, whose very existence is due to the demand for mobility. Increased speed and range of manœuvre will enhance the value of such a force, particularly when it is operating over large areas allowing full scope for these qualities.

Mobility, however, is dependent on adequate maintenance, and that of a mechanized force is peculiarly so, since it must be supplied with petrol, rarely if ever obtainable locally, whereas its predecessors have often been able to live on the country.

Adequate transport, in its turn, depends on a sufficient quantity of transport, possessing an efficient organization, enabling supply to be maintained in any conditions which can be reasonably anticipated. Increased speed and range of manœuvre will tend to enlarge the variety of these conditions, and provision must therefore be made for circumstances hitherto regarded as outside the bounds of probability.

Some of these circumstances and their bearing on the supply situation have been described, particularly those which may occur in a semi-civilized country, where there are often complications, due to lack of communications and to restrictions on free movement unlikely to occur in a European theatre.

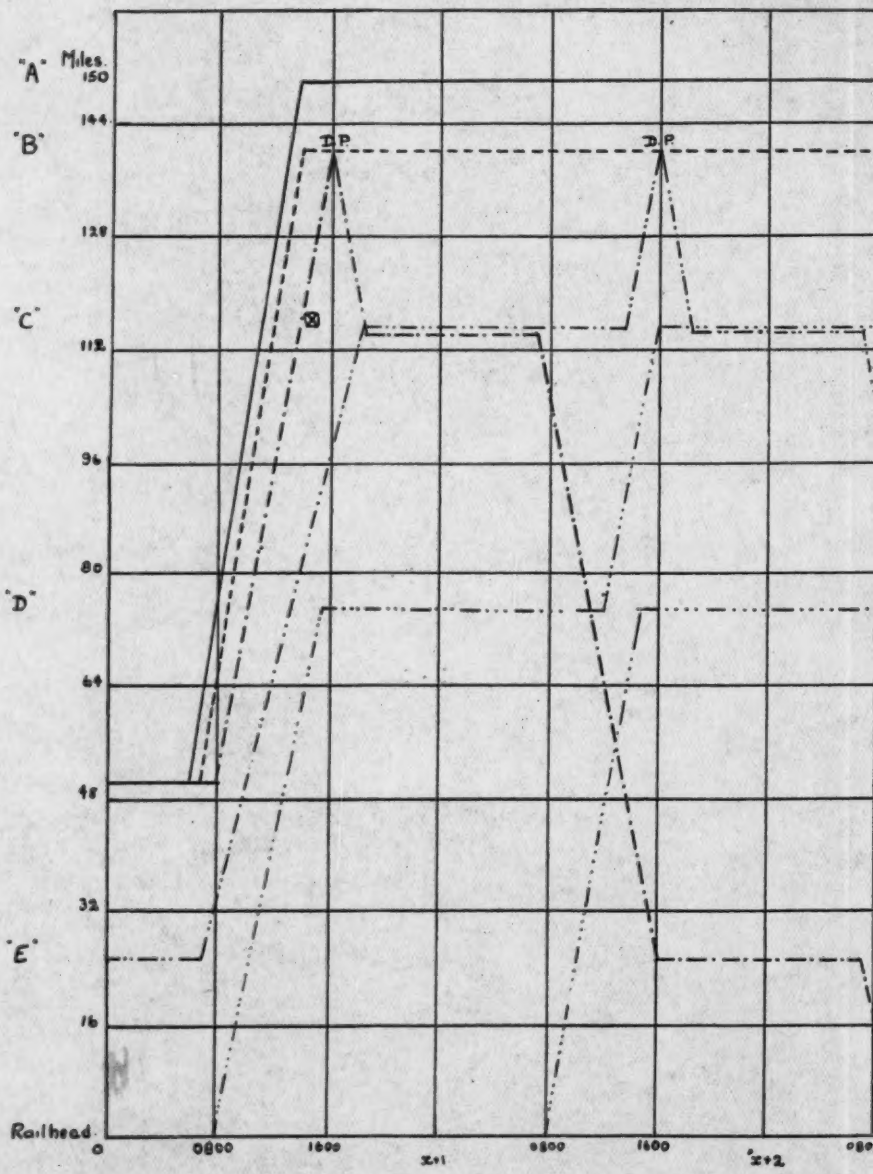
A system has been outlined, which it is suggested would meet the requirements of the circumstances described, and adaptable to varying conditions. It calls for the provision of sufficient transport to render a mechanized force effectually mobile, and not only when conditions permit. Without the provision of such transport operations might be prolonged unnecessarily and the mechanized forces lose most of their advantages derived from high mobility. It would, consequently, be false economy to minimise needs in this respect. At the same time, excessive transport is at all times undesirable, and the suggested organization is thought to be as economical as any that might be devised.

A suggestion has been made to simplify the operation, control and defence of that transport. The system put forward should not be complicated, and would be elastic, while it is considered that it should eliminate some of the difficulties which make for over-elaboration and consequent failure.

Suggested Working of 4 Echelon Sy

Running by day only in Fave

"A" Echelon : ——
"B" Echelon : - - - -
No. 1. Section : —·—
No. 2. Section : —··—

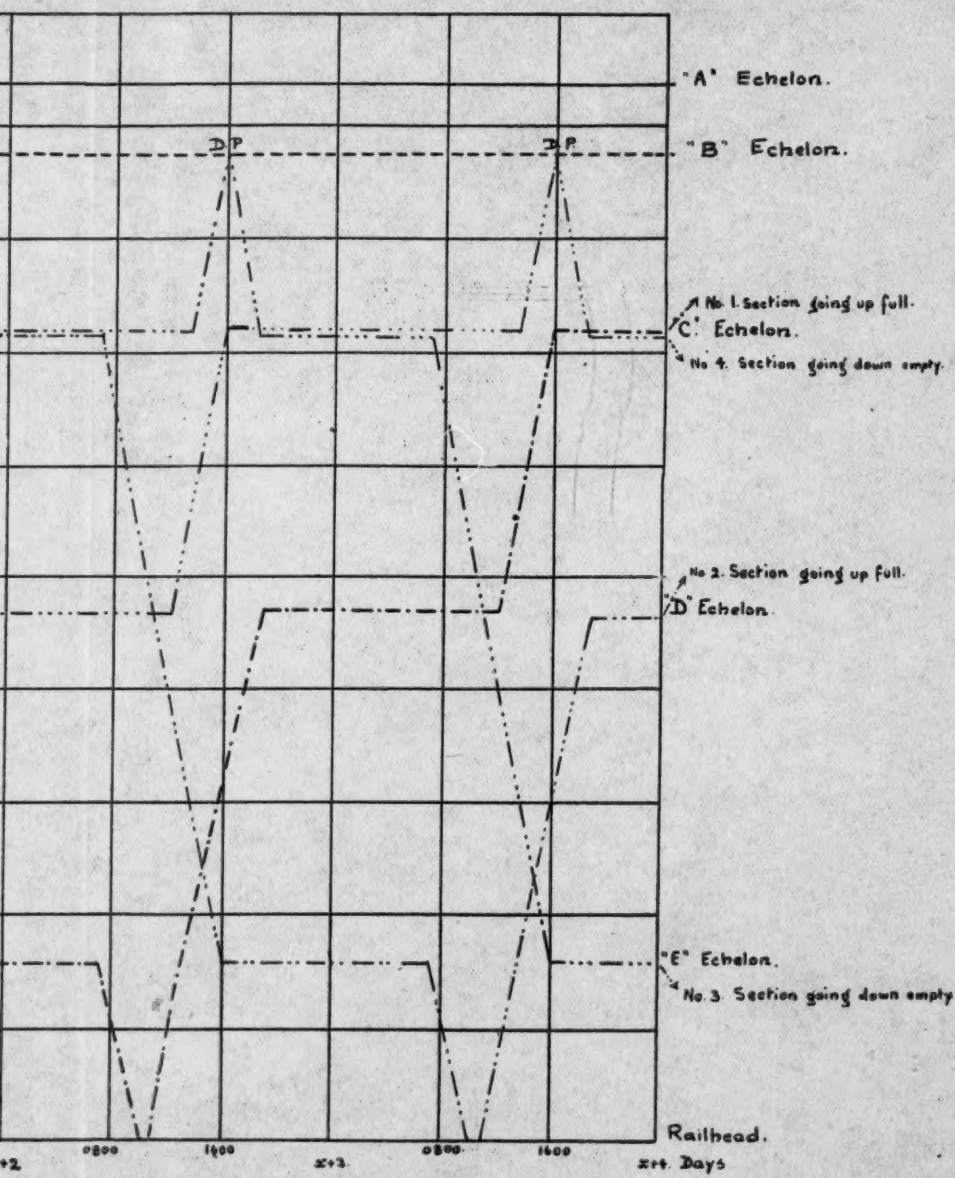


Hours of daylight during which full Sections are shown in "C" and "D" Echel

Sufficient spare drivers at "C" "D" and "E" Echelons to allow of relief if nec

helon System of Supply for a Mechanized Force
in favourable conditions.

tion : —·—·—·— No 3 Section : —··—··— D.P. : Delivery point for Supplies.
ction : —··—··—·· No 4 Section : —·—·—·— ⊠ = Change of drivers.



"D" Echelons allow for lateral movement
chief if necessary, for 1 Section each.

RECIPIENTS OF THE ROYAL UNITED SERVICE INSTITUTION GOLD MEDAL

(With rank of Officers at the date of the Essay).

1874 Captain H. W. L. Hime, R.A.
1875 Commander G. H. U. Noel, R.N.
1876 Lieutenant J. F. G. Ross of Bladensburg, Coldstream Guards.
1877 Captain P. H. Colomb, R.N.
1878 Major T. Fraser, R.E.
Captain E. Clayton, R.A.
1879 Captain The Hon. E. R. Fremantle, C.B., C.M.G., A.D.C., R.N.
1880 Captain J. K. Trotter, R.A.
1881 Captain L. Brine, R.N.
1882 No Medal awarded.
1883 Captain C. Johnstone, R.N.
1884 Captain G. T. Browne, Northamptonshire Regiment.
1885 Lieutenant F. C. D. Sturdee, R.N.
1886 Captain C. E. Callwell, R.A.
1887 No Medal awarded.
1888 Captain J. F. Daniell, R.M.L.I.
1889 Captain H. F. Cleveland, R.N.
1890 Captain G. E. Benson, R.A.
1891 Captain R. W. Craigie, R.N.
1892 Lieut.-Colonel J. Farquharson, C.B., R.E.
1893 Commander F. C. D. Sturdee, R.N.
1894 Major F. B. Elmslie, R.A.
1895 Commander J. Honner, R.N.
1896 Captain G. F. Ellison, Queen's Royal West Surrey Regiment.
1897 Commander G. A. Ballard, R.N.
1898 Captain W. B. Brown, R.E.
1899 Commander G. A. Ballard, R.N.
1900 No Medal awarded.
1901 Lieutenant L. H. Hordern, R.N.
1902 Major A. H. Terry, A.S.C.
1903 Lieutenant A. C. Dewar, R.N.
1904 Lieut.-Colonel C. E. D. Telfer-Smollett, 3rd Bn. South Staffordshire Regiment.
1905 Major W. C. Bridge, South Staffordshire Regiment, *p.s.c.*
1906 Lieutenant B. E. Domvile, R.N.
1907 Lieut.-Colonel A. F. Mockler-Ferryman, Reserve of Officers.
1908 Major A. B. N. Churchill, R.G.A.
1909 No Medal awarded.
1910 Captain P. W. Game, R.H.A.
1911 Captain H. T. Russell, late R.G.A.
1912 Commander K. G. B. Dewar, R.N.
1913 Major A. Lawson, 2nd Drags.
1914–15–16–17 No Medals awarded.
1918 Lieutenant W. S. R. King-Hall, R.N.
1919 Colonel J. F. C. Fuller, D.S.O., Oxford & Bucks L.I.
1920 No Medal awarded.
1921 Flight-Lieutenant C. J. Mackay, M.C., D.F.C., R.A.F.
1922 Major R. Chenevix-Trench, O.B.E., M.C., Royal Corps of Signals.
1923 Captain A. H. Norman, C.M.G., R.N.
1924 Major L. I. Cowper, O.B.E., King's Own Royal Regiment.
1925 Lieut.-Colonel J. C. Dundas, D.S.O., Royal Tank Corps.
1926 No Medal awarded.
1927 Colonel H. Rowan-Robinson, C.M.G., D.S.O., R.A.
1928 No Medal awarded.
1929 Wing-Commander C. J. Mackay, M.C., D.F.C., R.A.F.
1930 Captain D. W. Boileau, R.A.S.C.

THE HIGHER STUDY OF WAR IN THE SERVICES

By VICE-ADMIRAL W. H. D. BOYLE, C.B.,
President of the Royal Naval College, Greenwich.

On Wednesday, 21st January, 1931.

FIELD-MARSHAL SIR GEORGE F. MILNE, G.C.B., G.C.M.G., D.S.O.,
Chief of the Imperial General Staff, in the Chair.

THE CHAIRMAN introduced the Lecturer.

LECTURE.

IN dealing with the subject of "The higher study of war in the Services," I propose to confine myself to showing the need for such study, to indicating what it should include, to remarking on the facilities we possess for such study, and what might perhaps be done to augment them. Where the word "military" occurs it is intended to apply in its widest sense as appertaining to the profession of arms, whether followed by sea, on land, or in the air.

The definition of war has been attempted by several writers, and I shall not try to improve upon them; but the best known is Clausewitz' description of war as a "continuation of policy by other means." Sir Reginald Custance puts it more clearly as "war is the use of armed force to obtain a political object."

President Hoover remarked last Armistice Day "nations are always potentially in conflict." Questions continually arise between them which are settled by diplomatic means, by arbitration, or by reference to The Hague. But occasionally some matter arises which each of the nations concerned thinks vital to its well-being, and on which neither is willing to modify its attitude sufficiently to meet the views of the other. If neither will give way, war may result in order to bring about that settlement which could not be reached by diplomatic means. The "security" of the threatened interest becomes the national or political object in going to war. For to ensure its "security" is the policy of every nation—"security for every questioned right, every threatened interest, and the State itself, including its political system," as Sir Reginald Custance puts it.

If we can assume that the quest for security has, for centuries past, been the national object when we have resorted to war, it is worth examining which of our interests were threatened on those occasions. What has " security " always meant for us ? Admiral Richmond in his " National Policy and Naval Strength " says :—" The attitude taken up by this country in many of the great international situations and movements has been determined finally by the effect one or another course of action would have upon our strength at sea." This " strength at sea," it should be noted, must not be interpreted in terms of warships only, for the greatest source of that strength and the greatest of all our interests is sea-borne commerce.

War having been resorted to, hostilities will not cease until one or other of the opponents comes to the conclusion that there is no prospect of gaining its ends by fighting, and that the conference table offers more hope for the future than does the field of battle. The goal in war is peace, and the higher study of war should certainly include consideration as to how to use victory when it has been achieved. The last century gave us object lessons as to how peace should be made and how it should not. Whether these lessons were properly applied in 1919 is a matter of opinion.

A Peace Conference should bring about the final conclusion of the struggle, but this can only be the case if the terms upon which peace is arranged are just and moderate, and there is full security that they will be observed. To force upon the vanquished such rigorous terms that they will certainly be jettisoned as soon as recovery is sufficiently far advanced is to sow the seeds of future war. The seeds sown by the Treaty of Versailles are now germinating, and we find Europe dividing itself into two camps—the revisionists and the anti-revisionists.

In the Services it is not necessary for us to speculate upon the probabilities of war. The possibility that it will recur remains. So long as those Services exist, therefore, so long must their officers study war, and the greater the reduction in the armed forces, the more is that study necessary. In what was known as the Nazi trial last year at Leipzig, Colonel Beck stated in evidence that " the Reichswehr was taught that it was an army of leaders, the nucleus of the national army ; that every man in it would be worth ten in the future, and that a young officer was worth a general staff officer." That might well be applied to present day conditions in our own three Services.

Once it has been necessary to resort to war the armed forces become the principal factors in obtaining a settlement, and all the resources of the nation must be used to supplement the military effort. It has been brought home to the world that for the prosecution of war a nation

must, in future, mobilize all its forces, not only military, but diplomatic, financial, economic, political and industrial. As we learnt in the years 1914–1919, war is much more complex nowadays than it was in times not so very remote from our own. This is due not only to the greater elaboration of war material, but even more to changes in the economic, social and political conditions of the world. As the scope of war expands, those who have to study how it is to be conducted must extend their investigations so as to fit themselves to deal with these new and intricate problems. As war more and more involves the social life of the nation, so must the social aspects of war be studied increasingly in order to understand how the military side is affected. It is only by considering war as a whole that we can see how to martial all our elements of strength to be used in combination, how to organize the greatest national effort, and how to exploit victory when achieved. The higher study of war must, therefore, embrace the causes of war, how to conduct it, and how to conclude it.

This opens out a wide field of learning, but it is one which must be covered by those who aspire to high command. The sailor, soldier or airman who limits himself to a knowledge of his own particular Service may be a very efficient officer so far as he goes, but that is not very far. He can do the work but he cannot conceive it, and it is the ability to do both that we want in high places. Therefore we must train our most promising officers with that object in view.

This broader outlook must be of value to an officer in whatever part of the world he may be serving, for only by a knowledge of the wider issues can he direct his energies to the best advantage for the attainment of the national object. Without this knowledge his most vigorous action may hinder rather than help, for to act vigorously along a line which is not in accord with the accepted policy, or in a locality which is not the true area of war, is to play into the enemy's hands. Our premature advance on Bagdad is a case in point. Without wide knowledge and understanding a commander cannot make a true appreciation of the general situation, and if he cannot do that how can he utilize his forces to the best advantage? "Hawke is a very good sea officer but no Minister" said Pitt on one occasion, when he thought that that distinguished Admiral was opposing a scheme designed to help the general situation in Europe in order to further another that could have only a local effect.

It is, however, not so much in the actual leading of ships and troops that this form of knowledge is so valuable to a senior officer. Any officer who attains a certain standing is liable to be called into council, either with the Government at home, in the Dominions or in the Colonies,

with diplomatic or consular officers, British or foreign, and with business and shipping interests. In council, however, his views will carry no weight if it is found that he knows little beyond what he should do with his forces should he happen to meet the enemy. We want at all times, but particularly when at war, to ensure that the military view shall be given full attention, and an officer who shows that when formulating his opinions he has given the necessary consideration to all the various factors—political, economic, etc.—is far more likely to get his ideas accepted than one who has obviously failed to give these matters due weight.

We want no more such scenes as that which the Report of the Dardanelles Commission described as having occurred at the War Council held on 13th January, 1915, when it was decided to proceed with the expedition. To quote from the report: "after hearing the views of Mr. Churchill and Lord Kitchener; Lord Fisher, Sir Arthur Wilson and Sir James Murray remaining silent."

On this incident Lord Crewe in his evidence before the Committee stated:—"I should have been very sorry indeed to say what the effect would have been on our minds if Lord Fisher had made a full statement of his actual objections from the naval point of view speaking as First Sea Lord."

When war is being discussed it is very certain that the majority of Ministers and others in authority will welcome the views of their technical advisers if these views indicate that the subject has been carefully studied from every aspect and are not the result of a glimpse from between a pair of Service blinkers. In the higher study of war from the British standpoint a knowledge of the economic condition of the Empire is essential, for the question of how we are to ensure our sea communications must occupy a prominent position. With increased dependence upon them, and decreased forces for their protection, the study of how to make the most of the forces we do possess has become of vital importance. Although we may, as the struggle develops, be able to mobilize large forces which could be used in other areas of conflict, our opening moves must be directed to establishing the position at sea. This entails a vigorous pursuit of the military aim, the destruction or neutralization of all enemy armed vessels, and also energetic military action by the Navy, Army and Air Force in combination to capture or destroy those enemy bases which enable him to attack our sea-borne commerce, wherever such action has any hope of success. How to do that will, under modern conditions, require much thought. But one thing is quite certain—if that thought is not given beforehand, if we are not prepared for a quick "get away," if we allow foolish sentiment to interfere with the business of considering all possible eventualities, we shall go under.

It has been made very evident to our potential enemies how vulnerable we are, and we may be sure that due note has been taken by them of the fact. Some of them have long coast lines, free access to the oceans and oversea bases to work from; Germany possessed none of these advantages during the late war. In future wars we may well have far greater difficulties in maintaining our trade than we had in 1914–1918; and, if we do not succeed in preserving an even flow from the sources of supply to our factories and to the homes of the people, we shall not be able to fight; possibly not even to live. Too much attention cannot, therefore, be devoted to this subject by those who undertake the higher study of war.

Dependent as we are upon sea-borne commerce, we are not unique in that respect. The present tendency is for all civilized states to rely more and more upon sea-borne supplies of foodstuffs, fuel, material and, in war, of munitions. This has made it possible to apply economic pressure in a far more drastic form than in the past. We can, to a great extent, defend our trade by vigorously attacking that of our opponents; but in order to do so most effectively, we must have a knowledge of our enemy's necessities, sources of supply, his vulnerable points and so forth. Such a policy, however, can only be exercised at the expense of some inconvenience to neutrals. This makes it all important to study how we can bring economic pressure to bear on our enemies with the minimum risk of dangerous reactions upon ourselves.

No study of this aspect of war should be undertaken by British officers without a large scale map of the world at hand, showing our sea communications. It will at once be apparent how admirably we are provided with bases abroad. This is not fortuitous, but is due to the wisdom of our forefathers. Ideally placed, these bases now have an added importance as a means of extending the radius of action of the reduced number of cruisers we possess, and as ports of refuge and repair for our merchant shipping exposed to increased risk of damage at sea owing to the introduction of new weapons. A glance will also show what a menace these bases would be if in other hands. It may have been wrong of us to take them in the first place, as our faint-hearts would have us believe, but their capture was forced upon us by necessity. As Sir Julian Corbett says: "long experience had shown that until such positions were in our hands, the task of clearing the seas of hostile commerce destroyers must be precarious and indefinitely prolonged." That is equally true to-day. These bases are a priceless heritage, to be carefully guarded and not to be lightly disposed of.

It may seem that the attack and defence of trade is a purely naval concern and, therefore, out of place in a lecture on "The Higher Study

of War"; but it is essentially a matter of national interest. The naval action of capturing enemy ships at sea is only one, and not necessarily the most important, of the many methods by which this form of warfare must be pursued. Every Government Department and many business interests are involved; for instance, the Foreign Office as regards how far we can go with our contraband rules, and what measures can be taken in neutral ports by consuls and others; the War Office and Air Ministry as regards the shipping they require and what military action they can take; the Board of Trade, the Treasury, the Ministries of Labour and of Transport, recruiting and medical authorities are all involved; while financial, insurance and shipping firms, as well as port and harbour authorities, are closely concerned. It is, in fact, a good example of the ramifications that have to be followed up by those who undertake this study.

The necessity for such study was, of course, recognized long before 1914, but, like many movements, it started at the bottom and took some time to grow upwards. The South African War showed up many shortcomings; the Russo-Japanese War was full of lessons to be taken to heart. The writings of certain senior officers, ahead of their time, had fired the imagination and had stimulated thought among many of their juniors, but their teaching naturally did not carry the same weight among their contemporaries.

However, the movement for a more serious study of war was well under way in the opening years of the century, one valuable result being the formation of the Committee of Imperial Defence in 1904. When this Committee started on its labours it began by concerning itself mainly with naval and military problems. It found at once that these questions could not be treated apart and separated from those dealt with by a number of other authorities. It became necessary to enter into consultation with all the Government Departments, with the Dominions and Colonies and with many and widespread interests.

In consequence of this forethought, many excellent measures were put into force on the outbreak of the late war. To give only one example: state insurance for shipping did much to restore confidence when all was uncertain, but the scheme was only completed in 1914, and finally adopted in all its details forty-eight hours before the actual outbreak of hostilities. Unfortunately, time had not permitted of the same thoroughness in all directions, or we should have avoided many mistakes.

The point is that when the higher study of war was systematically taken in hand it was found that it did not consist merely in staging battles, but of investigations into economics and similar subjects not

so exciting, perhaps, but of tremendous importance. It is, of course, impossible to draw a clear line of demarcation between the military and economic elements in war, since fighting strength is itself dependent on economic activities. Again, though all should aim at strengthening the military effort, once we have resorted to war, this does not mean that every consideration must be subordinated to the military view, as it is imperative that a proper sense of proportion should be observed. Failure to do this cost Germany the war. The complete subordination of all other Departments of State to military policy, resulted in the adoption of a war plan which brought the British Empire in against the Triple Alliance, and a further miscalculation of the same sort ranged the United States on the side of the Entente. Yet the German scheme, from the purely military point of view, would, had it not produced these unexpected results, probably have been successful. Germany's antiquated ideas as to how to plan for war brought about her downfall. Her military leaders thought of little above major strategy, and would listen to nobody who did. As Sir William Robertson says, " strategy is bad if it aims at results which are politically undesirable." This is always liable to be the case when the higher study of war is neglected. Were the French and ourselves much better ?

Any plan of war made out by the representatives of only one section of those who will have to conduct it is quite certain to be framed within a narrow outlook and to ignore several vital factors. We had many instances of this in the late war, but the best example of all is to be found in the initial scheme. This was prepared by representatives of our War Office and the French Ministry of War. The following extract from Sir Henry Wilson's diary,[1] written on 14th February, 1913, shows us the mental atmosphere in which the planning must have taken place :—

> " My talk with Castelnau and Joffre was about Repington's recent articles in the *Times*, where he claims that our Navy is worth 500,000 bayonets to the French at the decisive point. I had written . . . to say that our Navy was not worth 500 bayonets. Castelnau and Joffre did not value it at one bayonet except from the moral point of view. . . . Foch is of exactly the same opinion as are Castelnau and Joffre."

The part that the British Army was to play in the event of an Anglo-French alliance had been under consideration for several years. Representatives of the country that had benefited most from sea power sat in consultation with those of the country that had suffered most by it, and yet they seem to have left sea power completely out of their

[1] " Field Marshal Sir Henry Wilson." Callwell. Vol. I, p. 122.

calculations; their own words convict these students of war of being completely in the dark as to the course the war was likely to take and to the real benefit to France of the British Alliance. The horizon of these distinguished soldiers seems to have been limited to obtaining the reinforcement of five or six British divisions to add to the eighty-five that France could put into the field.

We know now that some of our most distinguished leaders held that a better use could be made of the British Expeditionary Force, and that there was no need to commit it so completely to being an appendage to the French Army.

In the higher study of war we cannot afford to neglect the history of our foreign policy. Nothing emerges more clearly from such a study than that for four hundred years our statesmen have always aimed at preventing the coasts of the North Sea from falling into the hands of a great naval and military Power. To avert this we have on several occasions resorted to war. It is pardonable, therefore, to think that if this had been clearly recognized by those responsible for war plans from 1911 to 1914 more attention would have been paid to the safety of the Channel Ports. As it was, their importance only seems to have been recognised after we were already involved in war, with the result that our belated efforts to save them only met with partial success. Yet the reason for which we entered the war was the breaking of a treaty by Germany which had been designed by us to safeguard the Belgian coast, and it was the fact of Germany building her strategic railways to the Belgian frontier, and so threatening that coast, that led to our entente with France.

It is indeed difficult to believe that any arrangement could have been made which would have suited the German plan better than did the British plan. Far from "mystifying or misleading," we did the obvious; our intervention in the war on land did not cause the Germans to alter their line of action in any way, it introduced no new factor that affected their carefully planned arrangements, and, as they had to deal with us, we could not have made it easier for them to do so.

I am not saying that the decision which led to the adoption of the British plan was wrong, but what I do say is that it was wrong that such a momentous decision should have been taken without a most careful investigation by every Department concerned, so that what was overlooked by one could have been represented by another and given due consideration. That this was not done has now been revealed, and the responsibility did not lie with the War Office, for the Cabinet and the Admiralty knew what was going on, even if they took small notice. Singularly little interest seems to have been taken by the

sailors in what the soldiers were arranging, and Mr. Churchill tells us that on going to the Admiralty in 1911 he experienced great difficulty in getting the problem of the transport of the Expeditionary Force grappled with. It was not until 1914 that a Commission seriously studied the problem, and not until 4th August of that year that the printing of the details of the organization was completed. There was then nothing that the Admiralty did not know, but, although they do not appear to have been enthusiastic, there is no record of them having made any suggestion which would have allowed our naval strength to have assisted the efforts of our Army. The lesson of the Peninsular War seems to have been overlooked. It is said that one distinguished Admiral warmly supported sending the Expeditionary Force across the Channel, because he thought that the soldiers on the sea would prove an irresistible bait to the German High Sea Fleet.

Would it be wrong to say that the War Office was thinking of great battles on land, and the Admiralty of a gigantic fleet action in the North Sea, while no real consideration was given as to how best to use our combined forces and exploit to the full the unique power that we possessed? One thing is certain; to quote Sir William Robertson again, "we made war by departments."

To realize the truth of this saying let us recall for one moment the circumstances under which our war plan was adopted by the Government. This was done at a meeting of the Committee of Imperial Defence on 23rd August, 1911. This meeting was called to consider the problem of what we should do in the event of our becoming involved in a war between France and Germany. Those present consisted of the Prime Minister—Mr. Asquith—Messrs. Lloyd George, Haldane, McKenna, Churchill, and Sir Edward Grey, with Sir John French and Sir Henry Wilson representing the War Office, Sir Arthur Wilson and Sir Alexander Bethell the Admiralty. Writing in his diary of this meeting, Sir Henry Wilson says, "Asquith asked me to explain my proposals. I had all my big maps and I lectured for an hour and three quarters. Everyone very nice. Much questioning." At 2 p.m. the Committee adjourned for luncheon. Now to quote Mr. Churchill, "When we began at 3 p.m. it was time for the Admiralty, and the First Sea Lord, Sir Arthur Wilson, with another map expounded his views of the policy we should pursue in the event of our being involved in such a war." Everyone who remembers the two men will agree with Sir Henry Wilson's remark: "Then Sir Arthur Wilson developed his opposition plan, but he ran no chance in that audience." First, in the forenoon with everyone fresh, came the General; keen, young, with an attractive personality and an extraordinary gift of lucid and witty exposition; then after luncheon,

on an August afternoon in Whitehall, they had the Admiral, a man of outstanding qualities, but older, heavier, with no fluency, but a decided inclination to reticence. Moreover, the audience was not even impartial; several of the Ministers present had already been in consultation with Sir Henry. The point is not which plan was right, that matters little now, but what I do wish to throw into relief is the spectacle of the Admiralty and War Office striving to get what are described as "opposition" plans accepted by the Cabinet of the day.

At least the memory of these unfortunate divisions has caused matters to be placed on a more satisfactory footing, and any "opposition" schemes will be discussed in a more practical and seemly manner in the future.

It is not without interest to consider whether, although the acceptance of the War Office plan committed us to the maintenance of an army on the Continent, it would not have been possible, with a little imagination, to have made use of our power to launch a combined expedition, not merely for the sake of a combined operation as such, but to strike at a weak point in the enemy line instead of continually attacking where it was strongest. For instance, if the idea underlying the Dardanelles expedition had received the support of the naval and military authorities, and all the details had been carefully worked out by them, might it not have led to a wonderful triumph? There are some of us who think that the Dardanelles project was *the* great conception of the war, and that the failure to take it up revealed lack of imagination and vision, possibly caused by a too restricted study of war. Whether that is right or wrong need not be argued. What is of importance is to realize that no operation of war can hope to succeed if fumbled with in the half-hearted way in which that expedition was handled. The whole episode is an example of the result of failure to study how war should be conducted. To have succeeded at the Dardanelles would have forestalled the successes in Palestine and at Salonica, which in the end brought about the enemy's downfall.

The value of raking up past errors is to profit by experience in order to avoid repetition in the future. It is only by taking note of these lessons that the history of war is of real use to us, and if we wish to fit ourselves for the conduct of war we must not only know the events that took place, but also what led up to them, in order to grasp their true significance. For this a study of our foreign policy is just as necessary as military history, and added to this there must be an understanding of the elementary facts of economics, national finance, and psychology, not with a view to posing as experts in those matters, but to be able to follow the experts when they are giving their advice.

It may be thought that I am not giving full consideration to all the steps that have been taken for dealing with these matters as a result of our war experience—the activities of the Committee of Imperial Defence and its sub-Committees, for example; but while giving every credit for all that has been done, do not let us get into the error of thinking that we are the only generation that has tried to put matters right after a war has shown up weak spots. There is nothing more remarkable in the study of history than the fact that almost every war sees a repetition of the mistakes made in the previous wars; to quote Sir Frederick Maurice,[1] "men are slow to learn from the experience of others, and soldiers are among the slowest." The only way to guard against this is constant revision in the light of modern developments, and this can only be done if there is a sufficient staff to do it.

Annually we see attacks on the number of officers on the staffs employed at the Admiralty and War Office, and these are sometimes supported by officers of the Services. As war memories and the war generation fade away, there is danger that the soporific effects of long years of peace will, as before, begin to take effect; effort may slacken, and the dust accumulate in pigeon holes. We must keep the lessons learnt continually under review, for experience, unless kept up to date, is useless, and plans require constant revision.

Now let us examine what facilities exist within the Services for the higher study of war, but before doing so we must, in passing, pay a tribute to the work of the Royal United Service Institution, which has kept the flag of military study flying all through the hundred years of its existence. Founded in 1831, it has passed through a period during which military thought reached a low level, but the Institution, through foul weather and fair, has consistently done its utmost to carry out the object laid down in the Royal Charter as "the promotion and advancement of naval and military science and literature."

Then there is the Committee of Imperial Defence. The Empire owes much to Lord Balfour, but, perhaps, his greatest achievement for its well-being in the future was the founding of that Committee in 1904. Defence policy, with which the Committee is essentially concerned, is, however, bound up with general policy, and this entails consideration of many questions: financial, home, foreign, imperial and colonial. This work is largely done by sub-committees, and the number of people thus associated with defence research work must, in the course of a year, be considerable, with the result that the educational value of the Committee is very great. Lord Oxford in his book, "The Genesis of the War," Sir Julian Corbett, in Vol. I of "Naval Operations,"

[1] "Robert E. Lee—The Soldier." Sir F. Maurice.

and many other writers, bear witness to the extremely valuable work that the Committee accomplished in pre-War days. Since then the Committee has seen its work tested by war, and has been able to note how it could be improved, and in what direction it could be extended.

The institution of the Chiefs of Staffs Committee, a comparatively recent addition to the C.I.D., must, we hope, go far to protect us against any recurrence of such a state of affairs as that to which I have already referred, when the Admiralty and War Office put forward rival schemes to a committee of Ministers—like competing pedlars trying to sell their wares. It should ensure that, in future, any scheme adopted will be based upon sound military principles, and not lie beyond the military resources of the nation.

To come back to the higher study of war within the Services. In each of the three Services the attention of young officers is, and rightly so, directed to the study of war at an early age. Again, each has its Staff College, where its most promising officers are introduced to the higher study of war; but naturally this study is given a secondary place. The object of those Colleges is to turn out staff officers to fill the many subordinate positions on the staff, operational or administrative, which exist in all three Services. Though instruction is given in, and attention directed to, such matters as economics, trade, finance, international law, etc., and stress is laid on their direct bearing upon the conduct of war, these matters are not the primary object at that stage of an officer's education. As the staff officer will be judged by the abilities he displays as a sailor, soldier, or airman, a wide knowledge of his profession will be his main object, and the curriculum is naturally directed to that end. In fact, the primary duty of the Colleges is to turn out competent staff officers.

Neither the Army nor Air Force provides an opportunity for its senior officers to study the relationship between the national forces, which are not strictly military, and those which are. Here I venture to think they make a mistake. The Navy does try to do so by means of a Senior Officers' War Course, which, it is laid down, is for the purpose of "giving Captains an opportunity of studying the broader aspects of war before taking up a command afloat." This course lasts seventeen weeks.

The Army has, however, a course through which sixteen officers pass annually at the London School of Economics. This is attended by potential instructors at the Staff College and elsewhere. The Course does not deal directly with war as such, but the lectures must be of great educational value and of direct benefit as regards the higher study of war.

In an age when we shrink from mentioning war, when we try to assure ourselves, in spite of many signs to the contrary, that war is a thing of the past, a great step has been taken to assist this higher study by the institution of the Imperial Defence College in 1926. The Course at this College lasts one year, during which lectures are given by the best available authorities on every subject connected with national strategy. Among the students are Civil Servants, in addition to soldiers, sailors and airmen from all parts of the Empire. The Commandant is appointed for two years, the post being held in rotation by a Flag Officer, a General Officer, or an Air Marshal. The College is under the direct supervision of the Chiefs of Staffs Committee, and ensures that the Empire shall, in future, possess a body of officers who have really tackled the higher study of war. The chief drawback is that the number of officers who can benefit by the College only constitutes a very small proportion of those who need its help.

It is easy to understand that none of the Services would find it possible to allow more senior officers to attend a Course lasting twelve months, but I do suggest that all officers who are destined for any higher appointments should have the opportunity of acquiring a wide understanding of the object of their life's training. The busy routine of the Services is almost wholly taken up with considering war from the point of view of material and tactics, and the time comes when, if the best use is to be made of this knowledge, grand strategy and policy must be studied.

This raises the question—are sufficient facilities, at suitable intervals, afforded to officers to study this side of their profession? Personally, I do not think there are. In order to show my reasons for this doubt, I will mention briefly those which exist in my own Service, and which are not dissimilar to those in the two others. Sub-lieutenants at the age of nineteen to twenty-one, during their six months course at Greenwich—that is, while they are preparing to pass their examination for Lieutenant—listen to a course of lectures designed to introduce them to, and stimulate their interest in, the study of war. In view of the age of the officers and the circumstances under which they work, the instruction given must be of an introductory character only. Except for the haphazard instruction young officers may get on going to sea—and this depends very much where and under whom they serve—there is little to keep this interest alive. No further opportunity is given until an age is reached at which, if selected, a year may be spent at the Staff College.

The average age of the students at the Staff College is thirty-two, so that there is an interval of twelve years for those who are fortunate

enough to get this second chance. About thirty per cent. of those on the Commanders' list have actually done this course.

After this there is the Senior Officers' War Course, peculiar to the Navy, and to which I have already alluded. Endeavour is made to send all Captains on promotion, i.e. at an age of about forty-two to forty-four—an interval of another twelve years. It is, therefore, quite possible for an officer to pass the age of forty before his thoughts are systematically directed towards the higher study of his profession.

Now I will outline in very general terms what I suggest as the course of study that should be followed. Details must differ in each Service, but, broadly speaking, the need of one is the need of all.

The study of war can be divided into three parts :—

The First to consist of the study of war from the point of view of the Service to which the officer happens to belong, its history, and the basic principles upon which all war must be conducted.

The Second the study of war as a whole from the point of view of Imperial Defence, including economic considerations and general history.

The Third the study of war from the broadest point of view, which must include a sound knowledge of diplomatic and political history, so that the why and wherefore of happenings in the past are really understood, and can be used as a guide for the future.

These divisions are, of course, not arbitrary ; there must be a great deal of overlapping. It is far from my intention to suggest that any limit should be placed upon any officer's desire for knowledge. But study must be progressive ; we do not want to reproduce our friend Mr. Backsight Foresight, of Duffer's Drift fame, who knew all about the handling of an army corps, but found the subaltern's job of holding a post with fifty men to be too much for him.

In the first place the object for which we must strive should be to produce men in the higher ranks of the Services who are not only professionally efficient, but also competent in a general sense ; able to hold their own in any company, and keep the discussion on sound lines, when questions concerning the Services and their employment are being considered. In precisely the same way that an officer's professional outlook broadens as he advances in rank and experience, so should his general outlook as regards the preparation and conduct of war, and all that concerns it. Young officers should—as in fact they do—have their attention directed to the basic principles of war, the history of their country, their Service, etc., so as to start them on sound lines and encourage them to do private reading. But for reasons already mentioned, in the early stages this cannot be more than rudimentary.

A second course, in which all officers should be thoroughly grounded in principles of strategy and tactics and in the broader questions concerning war, should be undertaken before the mind has lost its receptiveness, and before the habits of study and concentration have been weakened by advancing years. It is important that officers should have their thoughts directed to the wider issues before they become "set," develop into technicians and regard everything from a strictly Service point of view. This course should be taken at an age of about twenty-five to twenty-seven—the latest at which it will fulfil these requirements. In the Navy, specialist officers have by this age completed their technical training.

Such a course would be of great assistance in selecting those to go through the Staff Colleges, and, possibly, would even allow these to be curtailed to some extent. The Staff Colleges have a very great educational value in addition to their primary duty of turning out staff officers. But only a proportion of officers can hope to be selected. The length of the course is prohibitive, let alone the fact that many excellent officers, if sent through, would only waste their time in undertaking studies for which they have no bent.

A certain percentage of these officers will rise to command units in their respective Services, and these should be given an opportunity not only to prepare to do so, but to have a "rub up" so as to be in a position to help their juniors, or at least be able to discuss subjects with them and encourage them to study. This I suggest is most important, and is amply provided for in a technical sense by appropriate courses, but I should like to see a Commanding Officers Course to study those aspects of war which are common to all three Services. This should, I suggest, be carried out at a common centre with a common mess, and last, say, three months. The students would be those officers to whom it had been decided to give commands in their own Services. They would vary in age from about thirty-eight to forty-five.

Finally, again in common, I would have a course for those officers selected to be the future Admirals, Generals and Air Marshals at which the curriculum would aim at helping to prepare for high command.

This is of course a very sketchy scheme, and before passing on I wish to make it quite clear that I do not think such courses at long intervals would of themselves be sufficient to attain our object. But they would help to direct officers in their reading and self-education and supplement that most valuable of all educational factors—experience.

The Imperial Defence College I should leave as it is, so that selected officers could, as it were, have a specialist course in the higher study of war from which to draw those who will conduct the other courses.

The great aim of these courses must be to stimulate thought, promote discussion, and foster a desire to learn. This is what keeps men mentally awake as the years go on. We want *vision*, not a stereotyped outlook liable to be clouded by the first original idea encountered, and *imagination*, the keystone of successful leadership. Youth must be encouraged to think for itself, not to grow up engrossed in technicalities, but to regard war as a great national effort, not as something that concerns the Services only.

This leads me on to my final consideration: the great value of these joint Colleges. Many of us may have heard it said that if officers care to study those abstract subjects that must be dealt with in the higher study of war, there are plenty of books available, and also opportunities for attending lectures at the various Universities. But the great benefit of the debates and discussions, formal and informal, that go on in mixed gatherings would be lost. The corrective applied on the instant, or at least an opposite view put forward, and the value of the instruction gained from rubbing shoulders with others educated on different lines, is invaluable.

Commander King-Hall in his book, "Imperial Defence," says: "the operations of the Services depend upon plans, and plans being a product of thought, it is of importance that there should be community of thought between the Services." And again, "obviously it is most necessary that the Services should have a common doctrine so far as the main principles of war are concerned." The common doctrine becomes alive by officers mixing and interchanging ideas freely, and in practice it is valuable to know that a colleague may be counted upon to view matters much as you do, should you happen to be dependent upon each other, and have to take action without previous consultation.

The danger of men pursuing their studies more or less alone is that they are apt to arrive at conclusions which, although specious, are fundamentally unsound. The value of common study by officers of all three Services is that any theory advanced can be subjected to close analysis and considered from every point of view. Also, it does much to bring about an understanding which will minimize the risk of friction in the future. The value of this is greatly enhanced by the presence of those who represent the unarmed forces of the nation, and the benefit to be derived from associating the Civil Service with our studies may be our salvation in the future. It is to be regretted that budding Ministers cannot also take part, but no doubt the trouble is to foresee who they will be. But here is still another advantage of the Committee of Imperial Defence in the education of those Ministers who attend its deliberations, the only danger being that too much weight may be given to economic measures rather than to energetic military action.

In conclusion I put forward the view that in these days of financial stringency and of the consequent reduction of our armed forces it is more than ever necessary to study war in all its aspects.

But before closing my remarks I wish to guard myself against any accusation of believing that such studies as I have mentioned can prepare a man to lead in war; for that, physical and mental vigour, and readiness to accept responsibility are essentials; no bookworm unaccustomed to command will be effective. General Spears in his book "Liaison" describes a certain French General as being "too much of a theoretician, too far removed from realities by long years of speculation and critical study to assume suddenly the responsibilities of actual command, when grip and character count for more than finely-balanced arguments."

On the other hand, the so-called "practical man," who can only see what is obvious, and who, because he will not read, has only his limited experiences to draw upon, will equally certainly fail if confronted by situations with which he is mentally unfitted to deal. As a writer tells us, "ignorance, fear and indecision go together. By paralysing the will through deficiency of sound ideas, ignorance causes indecision and want of promptitude, or else it makes a man reckless from sheer desperation."

To train our leaders, therefore, we want the happy mean, and the more we study the best way of obtaining this, the more likely are we to be successful when once again the safety of the Empire is entrusted to the keeping of the armed forces of the Crown.

DISCUSSION.

ADMIRAL SIR HERBERT W. RICHMOND: I fully agree with the Lecturer when he says that on account of the reduction of our armed forces there is now a much greater need for the higher study of war than there was previously. The smaller your forces the more economically you have to use them, and the more insistent does it become to make a very close study of the best way to use them. We cannot afford to waste anything now. The only way to avoid waste is to study economy—that is, management. There is a certain tendency to-day to say that everything to do with the study of war is out of place now that war has been renounced as an instrument of national policy. It is not without interest to remember that on 22nd May, 1790, the French Directorate issued a decree in the following terms: "The French nation renounces the undertaking of any war with the object of making conquests, and never will use its forces against the liberty of any people." We know what happened after 1790! Very nearly the same words are used in the Kellogg Pact of to-day. Therefore, with a warning like that in front of us, we in the Services at any rate must do our very best to make the forces as efficient as we can, and that we can only do by a very close, careful and intelligent study of the higher branches of warfare. From what I have seen,

that study has been neglected. Mr. Churchill had some very trenchant remarks to make on that in his "World Crisis," and I think we, at any rate in my Service, deserved them. We had competent administrators, he says, brilliant experts of every description, unequalled navigators, good disciplinarians, fine sea officers, brave and devoted hearts; but at the outset of the conflict we had more captains of ships than captains of war.

Marshal Saxe said he knew many good colonels who made bad generals; "if a man is not born with a genius of war, and if that talent is not cultivated and perfected, if he does not pursue the study of war, he never will be more than a mediocre General," is what he wrote in 1747. That is equally true of the Navy.

Admiral Boyle referred to a good many incidents during the war, such as the Dardanelles, which we have to look back upon with deep regret. One has got to recall those incidents and think why they happened. The more one reads the history of the past war on its planning side the more deeply one is impressed by the fact that we were very negligent in this important study before the war. I was at the Admiralty when, in 1913, the question was raised by the Commander-in-Chief in China as to what, in the event of war, should be done with the Germans in China at Kiao Chow. He was anxious that an attack should be made upon that place by a combined expedition at the earliest moment in order to deprive the enemy of a base. There were no plans for that. This drew attention to the fact that a large question of the policy of this country as regards overseas expeditions in war required examination. Anybody who studies the wars of the eighteenth century will find, and will be impressed by, the tremendous influence which the capturing of the bases of an enemy had on our strategy generally—that, and economics. It always strikes me very forcibly how clearly our statesmen, our soldiers and our sailors of that time were acquainted with the whole of that problem. But with all this long experience of operations of that kind at our elbows we had entirely blinded our eyes to it, and paid no attention to it at all. An attempt was made to get the question examined in June, 1913, but nothing was done until after very nearly twelve months of discussion, a joint naval and military staff was appointed to examine the general problem of operations against the Colonial possessions of the enemy. But the war came before that committee ever met. Then you have the extraordinary sight of the Cabinet sitting down on 5th August with a momentous decision to make, namely, how we should wage the war upon which we were to be engaged; and on the same day you saw a telegram sent to all of our Dominions overseas requesting them to fit out expeditions and attack the Colonial possessions of the enemy. Nobody can say that that indicates anything in the way of what I would call a serious or profound study in the higher study of war.

Fortunately matters are very much better to-day, but they can undoubtedly be made still better. In my opinion there is yet an undue attempt to depreciate the importance of the higher study of war. The Lecturer has said something about early teaching. In my opinion we should begin to teach our officers the study of war at a much earlier age—by this I mean at the same age at which their brothers are going to the University. I know there are those cursed examinations which boys have to pass at that time, but I should like to revise that, if possible, so as to get rid of those examinations at that time. The Lecturer says that the instruction must be only of an introductory or rudimentary nature. I am not quite sure what he means by that, and I hope he will explain it. If he means that it can only be very superficial, then I differ. I would say that a boy at that age is just as capable of studying this subject as he is of studying philosophy or any other subject. It is not really the details of the matter which we want a boy to learn

at that age ; we want him to learn the " anatomy of war." It is too much to think of a great combined Naval, Military and Air College for young men, who would go through it as part of their training.

With regard to the later stages, I am averse from having a great number of courses during a man's service. It seemed to me the Lecturer suggested about four or five courses. A man has got to learn the subject for himself. It is our duty, however, to give him a good start, to give him an understanding of the anatomy of the subject, and then to help him along afterwards. In my opinion a great deal can be done by encouraging a man to think and to express opinions. Personally I like heretics, such as Nelson and Wolfe were in this respect. I like a man to come along with rather fantastic ideas. I might mention a case of discouragement which came within my own purview when I was a Commander. The first lecture I gave at this Institution was an historical lecture, and I was told by the then Director of Intelligence that I had jeopardized my promotion by giving it. That is not the way to encourage people to study war.

A lot can be done by officers when they are on service abroad or at the Home ports by discussions and encouragement by the Commanders-in-Chief. I served four years in the Mediterranean between 1897 and 1901, and during the whole of that time I never heard one word about the strategy or the form of operations in the Mediterranean. It was at the time of the Fashoda incident, and I remember wondering what we should do if war broke out. I had not the slightest idea. That is not the right condition of mind to be in. Those who are in the Mediterranean should know all about the Mediterranean, and those who are in China should know all about China. In Lord Howe's time, there was an order sent out by him in 1784 by which all Captains were called upon to report on everything that was happening in their stations and the troops available in certain places. A good deal of that is now done by the Intelligence Department, but what can be done further is to make officers on foreign stations take an interest in such problems, work them out and study them, so that their minds are being turned in that direction. That will help more than courses in the study of war.

ADMIRAL SIR REGINALD N. CUSTANCE : About twenty-five years ago, when I was going into this subject, I was unable to find any book dealing with the matter philosophically ; that is to say in all its aspects from its political as well as from its military side. But I was astonished to find that at the end of the great French war the British Cabinet had a theory of war, which has since been entirely forgotten. That theory was announced by the Prime Minister after the decisive Battle of Vittoria in 1813, when he said that the political object of England was to give security not only to her friends but to her enemies. That theory was carried to the Congress of Vienna by Castlereagh and Wellington. Wellington was especially desirous that France should feel a sense of security after the peace. The British political object was to put Europe on its legs again. What happened at Versailles about a hundred years later ? This theory had been entirely forgotten. There was no Wellington to press the case of Germany and to show that it was a bad policy to exact every mark from her, and to leave her with a sense of insecurity. The idea that mutual security was the aim and object of war—that security for the enemy as well as for ourselves was the political object—was not put about until the year 1921. Even then, although it caught on, nothing happened. Three years later, however, Lord d'Abernon and Herr Stresemann took up the subject, and the result was the Treaty of Locarno. It was not until that Treaty introduced the idea of giving security to Germany and France that the mischief which had been done at Versailles began to be repaired.

I am putting these arguments forward to show the need for the military Services to study the political as well as the military side of war. That is of the first consequence, because the military professions alone study the theory of war in time of peace. They lost touch with it during the long peace after Waterloo, and in the late war they were misled by the Continental theory which is directed solely to imposing the will of the conqueror on the vanquished, as was done at Versailles.

The point of Admiral Boyle's lecture is that he wants us to keep touch with the theory of war during the long peace which is coming. If we do not do so we shall find ourselves in the same state of mind as in the late war.

THE LECTURER:

I do not think there are any points to which I need reply. Admiral Richmond questioned my phrase "rudimentary," in connection with the instruction given to young naval officers. I was referring to the instruction which can be given now in view of existing conditions.

As to the courses, there is a good deal to be said against mixing up senior officers and officers not so senior in a course. I think that courses do much to help a man in individual study later and that he should not be left entirely to himself but given every assistance possible.

THE CHAIRMAN:

I cannot help feeling that the subject of the lecture is an extraordinarily difficult one. It is called "the higher study of war" and not "the higher direction of war"; but the two are very difficult to separate.

I intend to confine my remarks to the higher study of war. What is the definition of war? As General Maurice says, we should "regard war not as the business only of sailors, soldiers, and airmen, but, when it concerns a vital national interest, as a great social upheaval which affects every aspect of national life and calls for the employment of the whole of the national resources in effective combination." The direction of war depends on members of the government, who must obtain their knowledge by private study and from the advice of their military and civil experts. What we have to consider is the instruction of the military advisers so that they are able to give the best advice.

When a boy goes into the Service we should first of all give him a good general education; we should teach him how to read and how to study in the future. At the present moment this is very lacking in the education of the young Briton, who frequently is not taught how to read for himself nor how to study. At Woolwich and Sandhurst the curriculum has been so altered that the Cadet is given a civil education with a military touch in it rather than a purely military education. In this way he is taught to study for himself; that is the first essential in the way of higher education for war. Next, the officer must be taught how to handle his tools. This is a strictly technical education. Personally I feel that for the first few years of his military life he can be left alone to get on with his technical education and to get to know thoroughly the tactics and handling of his own arm. I am not in favour in a boy's early days of giving him too much higher education.

Then comes the period of preparation for the entrance examination to the Staff College, and meanwhile the thinking powers of an officer are developed by a system of instruction and of exercises on paper. That is what I have in mind the whole time—the thinking powers of the future leader.

He then goes to the Staff College, and here I think there is some difference of opinion between the Lecturer and myself. Conditions in the two Services are not the same. At the Naval Staff College the course is for one year, and officers return later to a War Course. We have considered the possibility of this system in the Army, but we have come to the definite conclusion that once we have got students together from all over the world, we should go on with their education for a full period of two years. Admiral Boyle thinks that we should have a War Course in the Army. I do not consider this to be feasible under present conditions. But I do consider that the most essential thing for us to remember is that modern war can be studied properly only if all the Services and the civilians and everybody concerned study it together. I do not believe that any course confined to one Service can carry out a proper study of war. That is why we formed the Imperial Defence College, and the only reason why more officers do not go to this College is lack of money. If we had the money I am certain that all the staffs in the three Services would be only too glad to send more officers to devote one year to studying together. But it is essential that the whole of the British Empire should be represented at the Imperial Defence College, and not the three Services only. That is the only method by which we can get proper study in regard to the forces of the British Empire.

Personally I am not a great believer in lectures, and I do not think that any man's brain can digest a large number of them. What I do believe in is the method which was introduced into the Imperial Defence College by Admiral Richmond and carried on by his successor—the method of instruction by problems. At this College three or four big problems affecting the British Army are set for study during the year. For each problem students are divided up into self-contained syndicates consisting of a member from each of the three Services, and all lectures bear on the problem under consideration. That, to my mind, is the proper way to carry out the higher study of war. If we want to improve that study the best way of doing it is to increase the numbers at the Imperial Defence College. If the Imperial Defence College had been in existence before the war, and if some of the problems which had to be faced had been given to the College to consider, we should have looked upon the whole war when it broke out from a very different aspect.

A little too much emphasis has, perhaps, been placed on the Chiefs of Staffs Committee as the solution for all ills. This Committee provides a solution only if the three members of it have been trained to work together, and that is what we are aiming at. I am naturally saying nothing in disparagement of the present members, but am merely looking forward into the future. What we contemplate is that future Chiefs of Staff will have been trained at the Imperial Defence College, and will be able to discuss questions together from a common point of view.

I look upon the whole question of the higher study of war as being centred in the Imperial Defence College, and I think that very great progress is being made in the three Services to-day in what apparently was neglected in the past. I say "apparently," for I cannot help feeling that somebody must have studied those problems in the past two hundred years; otherwise the British Empire would not be what it is to-day.

Admiral Boyle, I thank you in the name of all present for the very able manner in which you have dealt with this subject. (The vote of thanks was carried by acclamation).

On the motion of Admiral Sir Frederick Field, K.C.B., K.C.M.G., a hearty vote of thanks was accorded to the Chairman.

THE DEVELOPMENT AND FUTURE OF ARMOURED FIGHTING VEHICLES

By COLONEL SIR FREDERICK PILE, Bart., D.S.O., M.C.

On Wednesday, December 10th, 1930, at 3 p.m.

GENERAL SIR WEBB GILLMAN, K.C.B., K.C.M.G., D.S.O., in the Chair.

The Chairman introduced the Lecturer, commenting on his past distinguished career, both in the Royal Artillery and in the Royal Tank Corps.

LECTURE

INTRODUCTION

ABOUT six years ago Sir Edward Grigg in a lecture given at the Staff College stated that the outstanding lesson of the wars of the British Empire was that we were always unprepared for war. He added that, in his opinion, the most skilled British general was he who could improvise best, and that as it was unlikely that we would be much better prepared in the future, ability to improvise should be one of the principal characteristics of every British soldier.

As regards the past, this has undoubtedly been the situation, and it is also quite possible that it may recur. Still at present the British Army stands very well ahead in matters of mechanization generally, and particularly in the development of armoured fighting vehicles. Indeed, it might be a matter of difficulty for most other nations to reach in peace time the level which we have now attained. It would involve converting the ideas of those nations to armoured war, and it would entail the expenditure of a great deal of capital, apart from a very considerable outlay in trial and research. It seems probable, therefore, that in the event of war, we should now be ahead of other nations as regards both the quality of our armoured fighting vehicles and the ideas underlying their use. Nevertheless, if we are caught by an outbreak of war with so few vehicles that in a short time they are all used up, the laborious research and all the money that is being, and has been, spent thereon will have been wasted, because in war time production is not handicapped by lack of money, and all nations will begin spending lavishly on the provision of the most modern types of vehicles. We might start ahead of our enemy in our ideas as to their

use, and we should be ahead in certain technical details, but the production capacity of countries like Germany is so vast that they would soon make up for any deficiency in design by the vastly greater numbers that could be manufactured. It follows, then, that success which should have been easily achieved early in a war would only be obtained six or nine months later after great expenditure of lives and money. It is probably no exaggeration to say that at a cost of £10,000,000 prior to a war, we could ensure attaining results during the first weeks of that war which might make it impossible for our enemy to carry it on, whereas a final victory might cost perhaps tens of thousands of millions if we had not expended the smaller sum beforehand.

If, as Sir Edward Grigg prophesies, we are not going to be ready, I think we should be very careful as regards the capacity for improvisation which he suggested should be one of the attributes of British officers. Everyone knows that the perfect machine has yet to be built, and I think that always will be so. We are all improvisers; hardly a day passes but one is told that just a little alteration would improve a machine out of all recognition; some small difference perhaps in the turret of a tank or in the placing of a gear lever. In peace time such improvisations and new ideas are excellent; as many as can are being incorporated in our designs; but in war time they are fatal. That, indeed, is the first point I should like to emphasize, namely, that we should accept whatever tank we have when war begins and produce it without any alteration at all. The smallest alteration means a vast amount of work in the drawing office. It may also have far reaching reactions on other parts of the mechanism by making them unequal to their task. To show the work caused by a small alteration, I would instance a recent modification which we wished to apply to the turret of a medium tank. The tank was thought to be somewhat heavy; it was suggested that a new and better plate might be used, whereby the thickness could be reduced and weight saved. This was accepted since it seemed an excellent plan until it was pointed out by the Superintendent of Designs that the alteration for the turret alone meant 500 new drawings. That is the first point, namely, that the smallest modification may involve many alterations in the design and a host of new drawings, while it can easily lead to difficulties and delays that cannot be foreseen.

I now propose to discuss four types of vehicles: the medium tank, the light tank, the armoured car, and the machine gun carrier. Before doing so, however, I want to make clear the problems that mechanization has set out to overcome. This is best done by quoting the story of a very earnest officer who was lecturing his men on patriotism and the duties of the soldier. With a view to discovering how far the essential

facts had been grasped by his audience, he turned to one of them and said: "Now why should a soldier be ready to die for his country?" The warrior considered the matter profoundly and smiling engagingly, "Yes, sir," he said pleasantly, "you're quite right. Why should he?" To make that unpleasant privilege less frequent is the principle reason for mechanization.

The Purpose of the Armoured Fighting Vehicle

There is no need to do more than state that the tank came into being in order that men in battle might cross the last 200 or 300 yards of a zone, bullet-swept and protected by barbed wire, without danger to themselves. The tank, in fact, is no new idea. It is the idea that underlay the schemes of all the greatest leaders, to achieve their object with the minimum loss to themselves. That same idea underlay the use of elephants by Darius; the manœuvring of Marshal Saxe; the march through Georgia of Sherman. And from a tank which originally developed as a means of *crossing* bullet-swept zones has now been evolved a machine capable of *avoiding* bullet-swept zones, of travelling great distances and fighting battles at the end of them: no longer a short range weapon, but an exceedingly long range weapon. Such is the arm which we in Britain will have to wield in a future war.

It may be said, then, that besides the purely fighting vehicle, such as the tank, the need for a conveying vehicle which will bring the soldier to battle fresh and unwearied has become increasingly apparent. This is best explained by a slight historical retrospect. Ever since the days of the Romans the soldier has been loaded up with arms, accoutrements and other impedimenta at the expense of his mobility, and even of his physical endurance. The Roman legionary carried a huge weight that could never help him to fight. Ever since that time attempts have been made by mounting men on horses, as well by other methods, to reduce the load carried by the soldier. But the tendency has ever been to renew the loading process. So it came about that even the British infantryman of 1914 carried a weight such that the labour of a fifteen mile march was no negligible exertion.

Now of all soldiers, the machine gunner who has to carry his ordinary equipment while he man-handles the machine gun is the worst off. So the machine gun carrier has gradually been evolved in order to provide a means of getting the machine gunner into action fresher than was the case in the past. Progress in mechanization does not mean that the soldier will be less tired at the end of any particular battle than he has been heretofore; we still need the last ounce of work out of the man, but we want to let him wear himself out in fighting and not in conveying a mass of impedimenta about the country. In fact, we want him no

longer to be a mule but a fighting man. Thus the machine gun carrier is designed solely to convey a machine gun and the attendant gunners to the best possible tactical point with the least expenditure of energy by the crew. The design of this vehicle provides a certain amount of cover, so that the machine gun carrier of to-day is proof against ordinary rifle bullets, except from aircraft, at any range and against armour-piercing bullets at angles slightly varying from the normal.

The next step is to consider what stage has been reached in the design of these various vehicles.

The Evolution of the Tank

The first and possibly the most historical tank that has been and will ever be built was known as "Mother." The design of the body is not vastly different to the shape of the Mark V tank with which the war finished. The great wheels behind, by which it was steered, were unwieldly and tended to weaken the structure, and actually only one batch of tanks of this type was built. This tank moved very slowly; it was difficult to steer and the life of its track assembly was so small that to-day we would think twice before suggesting to any general that he should launch any of them to the attack. Perhaps 25 miles—as a maximum 50 miles—was the greatest distance that those tracks, or perhaps more accurately the sprockets and pinions, were capable of travelling.

The Mark V was very similar in appearance to the Mark I. It had a more reliable engine, and was the first type of tank fitted with epicyclics and was more easily steered; but as a fighting machine it was not very far different. It possessed almost every conceivable handicap. It was slow; not very easily handled; not very accessible; only barely bullet proof; it had a number of loop-holes and ball mountings through which splash could enter. So bad in this respect was it that after an action the whole crew were invariably bleeding from face and other wounds caused by splash. Gunnery arrangements were extremely crude. Its 6-pdr. guns could only bear one on each side of the vehicle, and from various ports Hotchkiss rifles could bear only on very limited arcs. It is true that the tracks, though still a source of great weakness, lasted a little longer; but the petrol supply was placed inside the fighting chamber and if the petrol tank were punctured petrol leaked into the cab, and so a great number of these tanks were fired in the war and their crews were burnt. Vision from these tanks was exceedingly poor —for gunner as well as for driver. Yet it was this tank, with all its limitations, which General von Zwehl referred to when he said it was "General Tank" that won the war.

There is one other war time tank which I will refer to, because it was the last of the type though actually it never went out to France. This is the Medium C, a tank considerably faster than the Mark V. It had no 6-pdr. gun, though I think if the war had gone on arrangements would have been made to have one fitted, because a means of knocking out enemy tanks is an essential part of the armament of every tank. Somewhat lighter than the Mark V, the Medium C was better as a fighting vehicle ; it was easier for the crew to handle their weapons. The tracks and sprockets lasted longer—about 200 miles—due to the use of manganese steel. The type of engine was still the water-cooled Ricardo, which actually was and is a magnificent engine. But the tracks were not sprung ; it was the last of the unsprung type.

The next design was a vast improvement. Between the Medium C and the new tank, the Mark I Vickers, a considerable amount of research had been carried on and various tanks had been built employing some system of springing. Not one of them proved a complete success. Eventually the Mark I tank was built by Messrs. Vickers, and when it first came out it was considered to be a revolution in tank design—as indeed it was. Nowadays it is the fashion to say that this type of tank is slow and not completely satisfactory, either as regards its maintenance or its fighting capacity ; but in its day it certainly was the best tank in the world. The system of its sprung tracks was just a simple system of coil springs working in cylinders—and a good deal of trouble it gave. The 3-pdr. gun was mounted in a turret giving all-round fire, whereas the Mark V tank had two 6-pdr. guns, short stumpy guns with a low muzzle velocity, which were most useful for firing case shot but could only bear to either side of the tank and not directly ahead or astern. The 3-pdr. gun has a high muzzle velocity and its task most definitely is to deal with other tanks—and a first-class gun it is for the job. The machine guns, one each side of the tank, cannot bear forward ; but the 3-pdr. and also a hotchkiss gun mounted in the turret have an all round traverse. The tracks no longer go all round the top of the vehicle, as in the Mark V. There is a certain disadvantage involved in the low track ; the tank cannot climb such a high vertical bank, but in order to obtain all round fire it is necessary to have the low track while the disadvantage from the climbing point of view is not so great as at one time was feared. The tank is equipped with a 90-h.p. air-cooled engine designed by Messrs. Armstrong Siddeley. An air-cooled engine has very considerable advantages, especially in hot climates, and it has been and is the policy of the War Office to fit air-cooled engines wherever possible in armoured fighting vehicles.

There is one other point about this tank. The petrol tanks are low down at the rear and outside the turret, so that if they were holed the

petrol would leak on to the ground and the danger of fire is therefore lessened.

The next tank to be evolved was the Mark IIA, this being simply an improved model of the last. But the improvement is far more in fighting capacity than in outward appearance, since in outward appearance the two are almost identical. The suspension is covered in and protected in this latter model, while it has been very considerably improved. Box bogies, instead of the old cylindrical type, have been fitted. The engine is an improvement on the former design. The track is heavier and is made of stamped steel. These tracks have a remarkably long life. Actually it seems impossible to wear out the plates themselves; all the wear takes place in the joints. By means of various mud-sealing devices—we have recently come to definite conclusions about these devices—we are now in a position to guarantee the life of a track on a tank of this sort as at least 2,000 miles, and possibly when trial has confirmed our present experiments the guaranteed mileage figure will be 4,000.

But it is in the fighting compartment that the greatest improvement has taken place. Instead of the rather indifferently sited hull machine guns, a co-axially mounted Vickers machine gun has been fitted alongside the 3-pdr. gun in the turret, so that both shell and machine gun fire can be brought to bear in any direction. The armoured plate is somewhat thicker than in the Mark I, while the arrangements for the comfort of the crew, the handiness of the controls for the gunner and for the tank commander have been very greatly increased.

The latest step has been the 16-ton tank, which is probably the most modern tank in the world. I will purposely omit any reference to the heavy tank, since all the best points of design of that tank have been incorporated in the 16-ton tank. If the tank originated as a close range weapon and eventually evolved into a long range weapon, then we may claim this to be a most modern, long range, weapon. It would be a crime to tie it down to short range work, for it is easily the most powerful weapon ever given to a soldier to handle. It is very fast, capable of covering long distances in a very short period, and mechanically is rapidly reaching considerable reliability. To use such a weapon to cross the two or three hundred yards of no man's land, and face the whole concentration of hostile anti-tank devices would be folly, since in it there resides an easy means of achieving the greatest aid to victory—surprise. Indeed, no enemy within a radius of 150 miles, one day's march, could regard himself as safe from an overwhelming attack by these vehicles.

Its weight is 16 tons; it has a 180-h.p. Armstrong-Siddeley air-cooled engine; the tracks are very similar to those already mentioned; the

suspension is an improvement on that fitted to the Mark II medium tanks, except for the front bogies, which first gave considerable trouble and have now been most satisfactorily re-designed. Indeed, the whole suspension has stood up in the most remarkable way to the great speed and wear and tear to which it is exposed. Three turrets are fitted. The back middle turret has a 3-pdr. and a .303 co-axially mounting. The two smaller turrets have .5 or .303 machine guns. All arrangements for control by the commander have been simplified and improved. The fighting position of the crew has been made more comfortable and the tank provides what is one of the first considerations—a very steady gun platform. Even at high speeds the gunners can keep their eye to the telescope and the telescope on the target.

Various devices have been fitted to ensure added safety to the tank. A Pyrene extinguisher system, which either the tank commander or driver can loose at will, and which automatically puts out any fire in the engine compartment, has been fitted. A direction indicator is being tried and, as far as we can see, appears to be successful. This arrangement, on something of the gyroscopic principle, almost tells the tank where it is. It is possible to drive a tank in a fog on a certain bearing, to deviate in order to avoid obstacles, and yet to arrive on the target with almost exact precision. There is no need to emphasize the importance of this feature when tanks are so often criticised as blind monsters. Actually they are to-day far less likely to lose direction in an attack than any other arm.

The petrol system is situated on the top of the mud guards. We would have preferred to arrange it lower down, but anyhow it is outside the tank and should this be punctured by shell fire, the petrol will fall outside the tank.

A considerable amount of progress has been made with gas-proofing this tank. A small positive pressure inside the tank is sufficient to prevent the ingress of poison gas. This positive pressure is being obtained through an electric fan which sucks in air through an anti-gas container. The engine is placed at the rear and is completely cut off from the fighting compartment. The tank is therefore much cooler than any of its predecessors. Various kinds of transmission and steering have been tried. The latest incorporated is a self-changing gear box, which is used both for steering and for altering gear ratios. It is early yet to say whether this type of box is the best, but it has certainly given some wonderful results.

I have already mentioned the danger of fire in armoured fighting vehicles. In order to obviate this risk almost every heavy oil engine that has been put on the market during the past three years has been

examined. Not one of them has been found suitable for fitting into these vehicles. But Mr. Ricardo has now designed a suitable type of engine, which has been fitted into a medium tank and is giving extremely good results. He is also producing a 6-cylinder engine of somewhat similar type for the 16-ton tank. We hope, too, that a smaller 4-cylinder engine, which he is building, will suit the light tanks.

The Light Tank.

It soon became apparent that expensive and valuable fighting vehicles, such as the 16-ton tank, require adequate protection and, therefore, some form of scout machine to precede them in their attacks. The C.I.G.S's Research Committee laid down that this scout machine should be a light tank, capable of high road speed and of the best possible degree of cross-country performance, so that it could maintain its position ahead of the medium tank and cross practically any country that is negotiable by that tank.

To understand the difficulties in the way of the construction of a light tank, it is essential to maintain a clear picture as to the role of such tanks. First of all they are scouts ; so that their duty is to precede the medium tanks, to send back information as to the situation, to discover possible opposition, and to be able to put up such defence as would allow the medium tanks to arrive. Then in the attack they must be capable of producing a high rate of well-aimed fire. As they are the skirmishers of the armoured brigade, they will be required in great numbers, and therefore they must be cheap. This, then, is the problem : to build a cheap vehicle, a fast vehicle, a vehicle containing W/T, a vehicle possessing sufficient stability to enable a gunner to aim accurately, and, lastly, a silent vehicle.

Controversy was very great—indeed it is to-day—as to whether this light tank should be a 2- or 3-man vehicle. The arguments against the 2-man vehicle are, firstly, that one or the other of the crew may be hit, and the light tank then becomes useless as a fighting vehicle. Whilst it is true that one or the other man may be hit, the probability is that if either of them are badly hit, the tank itself will have been so injured as to make it worthless. It is, also, for consideration whether it is economy to take 50 per cent. reserve personnel into battle to replace problematical casualties. These men must be of a highly skilled type that is not easily obtained and, moreover, they may be very urgently needed after an action to replace casualties or to repair the machines. Then it is said that one man cannot both command his light tank and fire a gun ; that he must be on the look-out for signals; consequently that if he is on the look-out for signals he cannot be looking out for targets. On the other

hand, there is no difficulty in equipping every light tank with some electrical contrivance by means of which the section commander can call the attention of each of the light tank commanders when required.

The ideal number of men for a light tank is not three men, nor two, but four. One man as driver, another as gunner, a commander, and a wireless and look-out man. Now to build a tank to hold four men would cost a considerable amount of money, while its size would approximate to that of a medium tank. To build a tank to hold three men would cost about half as much again as a 2-man tank. If this 3-man light tank is to have the same performance as a 2-man vehicle, it will cost very considerably more than half as much again, because this necessitates stepping out of the realm of light tank construction to produce a heavier vehicle having a larger engine and more powerful transmission; in fact, everything becomes heavier in order to attain this performance. Attempts, indeed, have been made to produce such a 3-man tank, but so far they have not been completely successful. At the moment, therefore, the 2-man light tank holds the field, and does very nearly approach the requirements that were laid down by the C.I.G.S's Research Committee.

I do not wish to suggest that this light tank has been evolved quite simply, almost, as it were, in a night. It has been built and rebuilt and modified for the last four years, and the vehicle of to-day bears little resemblance outwardly, and no resemblance inwardly, to the original light tank. The Carden Loyd chassis of to-day possesses certain noteworthy features. First of all, it has a very short track base. This was the first great difficulty encountered with regard to the light tank. Other things being equal the longer the wheel base, the smoother the vehicle will run. It is not possible with a light tank to give it a much longer track base than has been adopted unless the weight of the tank is greatly increased, whereby a larger engine becomes necessary. So we come into the vicious circle of the power-weight ratio. Various forms of suspension were therefore tried in order that the disability inherent in a short track base might to a great extent be overcome. A system of suspension has at length been produced which, while not perfect, enables the gunner to keep his eye to the telescope while crossing most sorts of country and makes the vehicle more comfortable to ride in. Accordingly, we now have a vehicle which conforms to the first requisite, namely, to bring accurate fire to bear on a target.

As regards speed, a Meadows engine which develops 60 h.p. has been adopted, and the tank thus possesses just enough speed to scout in front of the 16-ton tank. Actually one of these light tanks recently

covered ninety miles in three hours exactly. The track life is good. The armament is either a .303" M.G. or a .5" M.G.

I have not up to the present spoken about the comfort of the crew in A.F.Vs. An A.F.V. that is not capable of being used in the tropics is of little use to the British Army. But the first step with all fighting vehicles is to build one that will work, and the second step is to see that it is kept cool enough. We have learnt a great deal about the cooling of tanks and perhaps the principal factor is that the engine and fighting compartments should be completely separate, and that there should be through draughts of air through each compartment. In this light tank the engine is at the side and is bulk-headed off from the fighting compartment.

Accessibility is the bugbear of all tank designers. It is so easy to say afterwards "why could not such and such a thing be made more accessible." The tank is very much a jigsaw puzzle and it cannot be designed in a moment. Accessibility gradually grows. What is aimed at and what has been achieved in the case of this light tank is that unit replacements should, in the main, be possible. That is to say the engine as a whole can be lifted out of the tank, while the transmission can be uncoupled and also lifted out. Undoubtedly the quickest and easiest way of carrying out any repair work is by this unit repair system. This is also the easiest for the tank designer, because if he has to leave space so that a man can use his tools all round the engine there is a great deal of waste room which cannot be afforded in a light tank.

The Armoured Car

A third type of armoured fighting vehicle is the armoured car. Armoured cars in the shape of Rolls Royce 4-wheeled cars were used during the war in Palestine and Egypt with very great success. After the war it was thought that a cross-country armoured car was essential, and, as the six-wheeler chassis was then rapidly reaching efficiency it was decided to build a six-wheeled armoured car. The requirements laid down by the General Staff at that time visualised a heavy armoured car and a light armoured car, the idea being that battles would be fought by these armoured cars far away from the support of other arms and that some form of heavy armoured car to support the light armoured car was essential. As a result of these views the Lanchester car was built, and is now in service as a heavy armoured car. The chassis of this car is, as the name implies, designed by Messrs. Lanchester and is a first-class production. It is a large, heavy car, carrying three machine guns and a crew of four men. It possesses a good cross-country performance, and is in every respect a formidable engine of war.

With the advent of the light fast tank and the medium tank, capable of covering great distances at high speed, the need for supporting the light armoured car with a heavy armoured car became less apparent. All wheeled vehicles possess inherent disabilities in crossing rough country. On mud they develop wheel spin and dig themselves in, while a small ditch into which the front wheels can drop is a complete obstacle to them. At the best the cross-country capability of a wheeled vehicle is limited. If, therefore, a track vehicle could be brought up in support of light armoured cars in reasonable time, it would prove a much more efficient support than a heavy armoured car. At the same time the views of the General Staff as to the number of men required to man an armoured car have been modified. It is now agreed that three men—a driver, a gunner, and a car commander—should be an adequate crew. As a result of this opinion a light armoured car has been built. This is a three-man six-wheeled armoured car built on a Crossley chassis, which is a modified commercial chassis. The vehicle is thus altogether much cheaper than the car mentioned above. Putting aside the fact that it is cheaper, there are many points in favour of a light armoured car; for instance it can cross bridges that would not bear heavier types; it carries enough petrol for about 200 miles.

The armoured car is in a different position from almost any other fighting vehicle, in that only limited numbers could be employed. The essential characteristics of an armoured car are speed, silence and reliability. At the beginning of a war it is certain that armoured cars will be over-worked. But very shortly, as the forces begin to get into contact, there becomes less and less room in which to use such cars. Eventually they may have to be withdrawn to the flanks, until such time as operations become fluid again. With all other types of fighting vehicles there would appear to be no limit to the number that might be required. Silence in these vehicles, if an asset, is not so essential; reliability, though very desirable, is not as vital as it is in the case of an armoured car, which might be operating 200 or 300 miles from its workshops. Therefore, while the number of cars required is limited, they must be of the first reliability. We ought, consequently, to spend rather more on them than we do, for example, on the light tank. In fact it is probably economical to buy first-class machines which last many years. In this connection it is interesting to note that there are to-day in the Service armoured cars which were built sixteen years ago, and some of them should still do many more years work.

The Machine Gun Carrier

The fourth type of vehicle is the machine gun carrier. This is the cheapest of all armoured fighting vehicles that have been produced.

It originated as a one-man machine. From that it grew into a two-man machine, which could go either on wheels or on tracks, and this in turn developed into the Mark VI Carden Loyd, which is now in service. Machine gun carriers of various other types have been tried ; but they have all been bulky and conspicuous. The Mark VI Carden Loyd carries out fairly adequately the role of machine gun carrier. In the first place, the machine gun can be fired off the carrier or can be lifted out and fired from a suitable spot off the ground. The crew of the machine gun is conveyed on a trailer and is unprotected. If it be required to take the gun through a bullet-swept zone these four men must leave their trailer and move behind cover up to the gun position. The vehicle itself is sufficiently armoured to resist ordinary machine gun fire except from the air. It is very easy to get a false idea of these machines because for the last two years they have been put to innumerable other uses in the Army, having been used as light tanks, as light artillery tractors, as anti-tank gun tractors, and as machine gun carriers. They are not light tanks and are under-engined as light artillery tractors, but as machine gun carriers perhaps with a somewhat more powerful engine they will give good results.

The Present Situation

We have now reached a stage in the design of armoured fighting vehicles when it can be said that we have produced light tanks, medium tanks and armoured cars capable of carrying out the roles that the General Staff consider will be their duty in any future war. These vehicles can, of course, be improved upon. In some cases the life of some of the working parts could be lengthened ; in other cases the inaccessibility is such that a great deal of work is entailed if any part of the machine breaks down. They are still noisy. As gun platforms they have made great strides, though improvement is still needed. The crew is not yet immune from gas nor is it as cool and comfortable as it should be possible to make it. Research in all these matters is going on and there is very little doubt but that the tank of the future will be comfortable for its crew, give a pretty stable gun platform, be gas-proof, and be accessible and easily maintained. Such research and experiment may, no doubt, lead to considerable modification in the shape of the tank, but it will also lead to a definite saving in the cost of both manufacture and upkeep. Last year we obtained most encouraging results in the greatly reduced cost of maintenance of the armoured fighting vehicles of the Army, due in great part to better design and better maintenance by the crews.

My own opinion as to the types of tank of the future is that there will be only two main types, a light tank and a medium tank. The medium

tank of the 16-ton type can do all that a heavy tank could do, while for the light tank, I am one of those who believe that the two-man tank is both economically and tactically the correct solution of the problem. As for armoured cars, I think that we shall develop a light three-man armoured car, perhaps with the engine in the rear and certainly of first-class reliability.

Foreign Armoured Fighting Vehicles

In conclusion, I would like to add a resumé of the position of foreign powers as regards armoured war. Possibly for the first time in the history of the British Army all countries are watching what is being done here, not only with interest but actually quoting it as the right answer. Any nation that fought in the last war cannot view with equanimity the frightful losses that must occur when unprotected infantry is sent to assault machine-guns, and other countries, as well as ourselves, realize that where there was one machine gun at the end of the last war there may be ten or more at the beginning of the next, so that any plan which will avoid similar holocausts is of interest to all thinking soldiers. Many of the nations of the world would like to be able to produce armoured brigades and equip them with modern tanks, but most of the more powerful military nations are still dependent on man-power for their defence, and the cost of building a mechanized army is great. They, therefore, watch our efforts, small as they have to be for financial reasons, with great interest.

The main types of vehicle with which various powers are now experimenting seem to be the following. The American experiments are perhaps the more interesting, because they are, at the moment, going through a great many troubles which we have left behind us. The American light tank, T.1.E.1., was designed as a two-man light tank for the same tactical role as our light tanks. It weighed more than twice as much. After very considerable trials, both it and its successor, the T.1.E.2., have been scrapped, one of the reasons being that owing to the heat of the engine—which was in front—the driver could not see where he was driving. New experiments are going on with the Christie tank. The money voted last year for tanks of the type of the light T.1.E.1. has been transferred and Christie tanks are being bought. This, of course, is not a tank in the strict sense of the word; it is merely a tank chassis, upon which it is proposed to put some form of turret. This vehicle has undoubtedly travelled very fast, both on the road and across country; fifty miles an hour on the road and forty across country has been claimed for it, and there is nothing inherently improbable in these figures. But I think we can safely say that some years must elapse before a vehicle

such as this, with a tank body on top of it, can be produced as a completely satisfactory fighting vehicle. For the chassis weighs 7 tons, while with its armour and turret, etc., the weight would be in the neighbourhood of 13 to 14 tons.

The French Army is equipped with the Renault tank, a vehicle very similar to the war-time Renault, except that it has sprung tracks which make it more comfortable, and, of course, a faster vehicle. The French are experimenting with other models, but these have not yet been put into service. They have built a very heavy tank which is shown in Heigl's book. It is said to weigh about 70 tons and to carry a 75 mm. gun with crew of fourteen. Whether this type of tank will ever be put into production or not it is impossible to say, but it is obvious that a tank as heavy as this would need special bridges and special railway tracks to carry it.

The Czechoslovaks possess an armoured car which is interesting because of the shape of the armour. An attempt was made to produce armour which would never present a vertical face to the enemy. It is common knowledge that even a slight variation from normal impact—that is to say from an impact of 90 per cent.—very greatly increases the resisting power of the armour; we attempt to design our plating in the same way. Here the plates are curved, a feature which enormously increased the expense of the type.

Other countries interested in armoured fighting vehicles are firstly Italy, where the Fiat works have produced various tanks, one of which mounted on a Pavesi chassis and fitted with wheels with large spuds is noteworthy. Secondly, there is the Soviet Union. The latter still possess some of our old Mark V tanks and some Renault tanks. We may be certain that they are building tanks, but have no reason to believe they have put into service any really modern tanks. Therefore, it is fair to say that to-day our Army is certainly as well equipped in the matter of armoured fighting vehicles as that of any other nation, and that in those experimental vehicles which I have described we stand ahead.

The Future

We can only retain this position of superiority if we continue to experiment with these vehicles, and, when we have decided to adopt a new type, we put some examples of that type into service so that those defects, which can only be revealed under the iron hand of the soldier, should be brought to light. This policy not only commends itself from the military point of view but from the financial point of view also, since every year we are saving money by finding better methods of preventing wear, better methods of maintaining vehicles, better methods

of training personnel to handle the vehicles without doing them avoidable damage.

The trend of present design is towards a tank that is very fast and exceedingly powerful, capable of traversing long distances without re-fuelling and endowed with what for the want of a better word I call great stamina. This tank is as different from the tank of the Great War as modern artillery is different from the muzzle loaders from which Napoleon and Wellington threw bits of iron at each other across the fields of Waterloo. That muzzle loading period was the end of an epoch—the epoch of beautiful uniforms and devastating inefficiency. The tank of 1918 saw the end of another epoch of war, the epoch of mud and blood. The tank of that day was a last desperate expedient to bolster up that bludgeon type of war, and indeed it only just won through, for on the 5th November, 1918—the last occasion on which tanks were used—only eight machines were available.

The modern tank introduces a new epoch. Like the rapier wielded by those heroes of our boyhood's storybooks, it can strike the enemy's body where we will and, as it were, in the twinkling of an eye.

DISCUSSION

CAPTAIN B. H. LIDDELL-HART: Two reflections occur to me after listening to the lecture. The first is with regard to the direction indicator. A significant point in the history of the Great War is that almost every successful attack was made in a fog, a point which has not been adequately stressed. I feel that the direction indicator, if developed successfully, offers great possibilities of exploitation. We might cloak our tank attacks, not by local smoke screens, but by preparing artificial fog on a large scale. I should like to hear what the lecturer thinks of that suggestion.

My other reflection bears on policy. The Lecturer remarked that a sprinkling of tanks such as we have to-day would be quickly used up at the start of a war, and that we should thereby lose our present advantage, whereas by the expenditure of a few millions before an outbreak of war we might save thousands of millions afterwards—that is by ending the war quickly, obviously a logical deduction. Its immediate significance, however, lies in its bearing on our present policy, which we have been pursuing ever since the war. That policy, in brief, seems to be one of keeping the present pattern Army intact while using any spare money we can find on mechanization. Each year the Government has a habit of reducing such spare money. Consequently each year there is less available for mechanization. The ultimate end seems, logically, to be zero.

We have a habit of blaming the politicians for this reduction. It may be just to blame them, but at the same time it is of no practical use. The habit of pruning the Army Estimates yearly during peace is an age-long habit. The only practical course is to foresee and forestall it, and, by reducing the old, to find money for the new. The lecturer's reference to the desire for a perfect tank and the unlikelihood of ever reaching perfection seems to me to go to the root of the matter. In equipment as in design we shall never reach any goal if we remain

idealists. We need to be realists—and make the best of the actual situation. If, when war comes, the Army is not large enough, the soldiers can rightly put the blame on the politicians. But if the Army is not efficient enough, if it lacks the means of pulling its weight under modern conditions, the responsibility lies with the soldiers. They cannot escape that dilemma.

The most hopeful point brought out in the lecture is that the cost of maintaining armoured fighting vehicles has grown less, even though the machines have grown older. The cost of an infantry army can never become less, in proportion to its size, without loss of efficiency. If, on the other hand, a mechanized army, through better maintenance, can reduce its upkeep cost, the fact suggests a possibility for the future. For the logical deduction is that once we have a mechanized army we might keep its strength intact, while still obtaining the yearly saving which the politician will always demand.

MAJOR-GENERAL S. C. PECK: It would not be easy to explain the course of development and the future of armoured fighting vehicles without going into an excessive mass of technical detail. I think that Colonel Pile has taken a middle course with considerable success. I would, however, emphasize his remarks by stating that only quite lately the tank which he described at some length has actually done a journey of ninety miles at a rate at least double that of our present medium tank—which is, of course, highly satisfactory, all the more so because it indicates that even this great increase in speed and weight has not been too great a handicap to the life of its tracks. Even so, we have to admit that until it is put into the Service it is impossible to estimate exactly its military worth and value. This experience is common to all motor manufacturers of to-day. One of the chief producers of motor cars stated not long ago that it was his experience that he could never get to the end of a design, and that he never knew the true value or otherwise of his models until they had been in the hands of the public for at least two years. Our public are the Tank Battalion, and until these 16-ton tanks are actually given to the Tank Battalion, it is rather difficult to lay down any definite policy with regard to their production.

Another point which is one of eternal interest, is the compression ignition or "heavy oil" engine. The provision of such an engine is a matter of extreme importance, yet it is true that no such engine actually is running in mechanized vehicles in this country, or to any extent in any other country. Much has been written in the Press which might lead people to imagine that these compression ignition engines were actually in production. That is not the case. As long as six years ago we tackled this problem, but we have not yet found what we want. It is of course a definite principle of development that there must be a long interval between the inception of an idea and its practical interpretation in a concrete form. Again, there must be another interval, sometimes long and sometimes short, between this concrete form and a form in which it can be considered to be either economical or reliable. I would say that this takes as much as three or four years. It also seems to me that most inventions which need the "puff" of the Press are not worth very much, or, if they are, they are generally in a very ill-developed condition. Only about two years ago a picture of a wonderful tractor appeared in a daily paper. Within a week there was ushered into me a gentleman bearing a letter of introduction signed by a very well-known man. The burden of the letter was that here at last was an engineer who, unknown to us, had designed a cross-country tractor that had definitely proved itself a great success. After a tornado of words he paused, and I was able to ask him "When did you cease producing cocktails?" He looked

annoyed. So I remarked that I had last seen him behind the counter of Jack's Bar in Paris. Things are not always what they seem. Nevertheless, I would not discourage anybody from sending us press cuttings, because it is always worth sifting a ton of sand to extract a single grain of gold.

I would like to add a few words about the inception of the light tank. The first idea was a scout tank. We thereupon asked three eminent tank commanders separately to give us their ideas. They all agreed upon two points—first that they must be cheap, and, secondly, that they must be light. But then their ideas began to diverge. One maintained strongly that any scout tank must at least have the same cross-country capacity as the tank in front of which it was going to scout. That seemed very reasonable but meant that the scout tank must be as long as the medium tank; that is to say, at least 17 ft. long. Another maintained that the speed of the scout tank must equal that of a medium tank, which meant that its engine would have to be practically of the same horse-power with transmission and suspension in proportion. The third also laid down that it must be at least as well protected as the medium tank for which it was going to scout, this meant weight. Consequently, if a light tank had been evolved embodying all these ideas, it would have been heavier, more expensive and a better target than the medium tank for which it was going to scout. Thereupon the General Staff came to the rescue by establishing a definite specification which resulted in the present light tank. That shows what very difficult questions design and development can raise.

The lecturer's view is that the ideal crew for a light tank is not two, nor three, but four men. Ideals are sometimes dangerous; to my way of thinking it could equally well be argued that the right crew for a light tank is one man; if we argue still further, none; so let us have a Robot tank. I consider that in designing an armoured fighting vehicle the first requisite is to concentrate on the object for which it is being designed; having done that, it is necessary to determine the chief essential to bring that design into being. If the first task of the light tank is to "scout," it should be clear that its first essential is inconspicuousness. Every other essential, I think, should give way to that, although I realise that it is extremely important that the light tank should have high speed and good protection. But there is a great gulf fixed between the ideal and the practical, and I at any rate have arrived at the same conclusion as the lecturer, namely, that the best practical light tank is a two-man tank. But I have arrived at that conclusion from apparently the opposite premises to those adopted by him.

THE LECTURER: Captain Liddell Hart spoke about the direction indicator and the use of artificial fog in war. The direction indicator, if it is successful, will undoubtedly be applied to all tanks. I think we are in agreement that it is madness to let tanks go into an attack unless they can be protected. The best protection for tanks is smoke. The best tank attack in the war was that at Cambrai in 1917, when the smoke was extremely thick. One hopes that smoke will, in future wars, be the normal thing to precede a tank attack. There are various smoke-producing machines. The light tank has been equipped with smoke containers of two sorts, one of which drops a sort of row of eggs as it goes along, each of which bursts into a cloud of smoke, and the other of which throws out smoke from its exhaust. Both of these are, in their way, valuable, but the best form of smoke screen is that produced by some appliance that will throw out smoke in front of the tank which is attacking. A device such as the direction indicator makes possible the application of some form of artificial fog to protect the tanks in attack. A fog chemically produced, possibly using aeroplanes in order to lay it, has very great possibilities.

CAPTAIN ALTHAM: I would like to ask whether tanks are in any way capable of dealing with aircraft attack, especially against themselves; whether their guns have sufficient elevation for them to be used against aircraft, or are other means of defence contemplated?

Another aspect of the employment of tanks is of particular interest to the Navy. From time to time the question arises of landing tanks either on a beach or in a harbour where the local lifting appliances are inadequate, or where they have been destroyed by the enemy. When it comes to dealing with a 16-ton tank, the problem is not an easy one. Yet, presumably, if our tanks are required for active service at all, it will almost certainly mean they are to be employed overseas. It would be interesting therefore to know whether we are anywhere nearer the amphibious tank as a practical solution of the difficulty.

The amphibious tank is, I know, generally regarded as something of a freak, but last week we had a very interesting lecture describing the work of our naval gunboats on the Yangtse, and there one could not help visualising small tanks waddling ashore from the ships and dealing with a mob of "Red" Chinese most effectively. The gunboats on such occasions often labour under the disadvantage that before they can use their guns they must be able to distinguish between friend and foe, and that, perhaps, when anchored some way from the shore.

THE LECTURER:

With regard to anti-aircraft machine guns, a tank has not got very much room in it, and if we put into each tank an anti-aircraft machine gun we must add one man at least to the tank's crew to work that machine gun, because a man cannot look at the sky and at the targets on the ground at the same time. We must consequently overcrowd an already full vehicle. Therefore, we have recently developed twin anti-aircraft machine guns mounted on separate tank chassis to go with the tanks. These twin machine guns have now been tried out both on light tanks chassis and on armoured car chassis. They are very powerful weapons and when they have proved satisfactory it will become a question for the General Staff to say how many should be allotted for the defence of any particular unit. I do not think we will ever put into the tank itself its own anti-aircraft defence.

As regards amphibious tanks, there is no reason why they should not be built. After all, I suppose if you put tracks on a submarine, and coupled them up to the engines, it would very nearly be a tank. But at the moment we are not building one.

THE CHAIRMAN:

The Lecturer began by saying that we started our wars unprepared. To a certain extent that is true, and to a certain extent it is not true. We cannot be prepared for wars in every theatre of war. When we think a war is pending, like the Great War, we do our best to be prepared for it. Our Army has to be prepared to proceed to any place on this globe where it may be required, but we cannot possibly meet all the requirements for any specific theatre in which a war might arise at very short notice. Take the South African War; we found we were short of horses, and there arose extra demands for them. When the last war began we wanted more machine guns. Now if we go to war on the Yangtse we learn we shall want a sort of amphibious tank, but I fear we shall never be given the money to make one in peace time. We have to do the best we can with the means at our disposal. If we have the misfortune to be engaged in another war, it is to my mind obvious that for reasons of finance we shall begin with a very

limited number of armoured fighting vehicles. Captain Liddell Hart talked about policy and finance, and suggested that we were idealists. In peace time, no doubt, the better is the enemy to the good; I trust we are idealists of that type; that we are idealists in trying to make machines thoroughly reliable and so as not to require too much maintenance; otherwise they are no good under active service conditions. We are succeeding in our efforts, for during the current year owing to this increased reliability, as well as to the improved knowledge of the care and maintenance of vehicles, we have been able to save enough money largely to supplement our numbers of armoured fighting vehicles.

Whatever Government is in power, I can see no possibility of money being voted to provide reserves of armoured fighting vehicles, each of which may cost many thousands of pounds, either to be put into mobilization store and become obsolescent, or to be turned over. I would like them to be available, but I know perfectly well they will not be there, and then what will be the result? In the first big fight we are bound to have casualties to our armoured fighting vehicles, and, supposing the two opposing sides are equal, that side will get the second blow in first which has one of two things—either very good workshop organization in the rear of its own lines, or its armament firms freely functioning. The country which can keep its machinery going in peace time will get to production first. For that reason those of us who study this question abroad find that foreign Governments are using every endeavour to keep the armament firms' machinery in being.

I entirely agree with the Lecturer regarding new improvements. As I have already said, we must get a really reliable vehicle. He said that the 16-ton tank after four years of life was rapidly reaching considerable reliability. When dealing with what the Lecturer referred to as the sometimes iron-handed British soldier, you want something really reliable. It takes three or four years to produce that. I feel that if we are too idealistic we may have too many machines in use, and that we shall not be fit to go to war with all of them. If I were M.G.O. for life (which I luckily cannot be!) I should endeavour to standardize each machine as soon as it became really reliable. We have the 16-ton tank, which is as good as we want. We have the light tank, which, after four years of experimentation, we are only just getting right. We have the light armoured car, which is in its infancy. We have a machine gun carrier, which we think we know something about. If after another year or two more we could be satisfied with them, I would like to standardize each for a period of years, because under no other method that I can see is the supply of spares for those machines in war to be carried out.

My chief points are that, first of all, under peace conditions, we shall never have enough money to have anything more than a limited number of armoured fighting vehicles. Consequently these must be of as few types as possible, and must be thoroughly reliable. Then we must have a workshop organization, so that we can repair the "lame ducks" rapidly, so as to get in our second blow first.

Captain Altham referred to the difficulties of landing tanks. These come under the heading of staff arrangements and are not in my province, but I think it safe to say that, should tanks or any heavy armoured fighting vehicles be sent overseas, adequate arrangements for landing them will be arranged.

The customary votes of thanks to the Lecturer and the Chairman were passed by acclamation.

ARMOURED CARS IN DESERT WARFARE

By Squadron Leader G. E. Godsave, R.A.F.

On Wednesday, 14th January, 1931, at 3 p.m.

Air Marshal Sir Robert Brooke-Popham, K.C.B., C.M.G., D.S.O., A.F.C., in the Chair.

The Chairman, in introducing the Lecturer, said: If you look at certain large scale maps of Iraq and surrounding countries you will see on them little wriggling red lines over areas that are otherwise blank. Those red lines represent the tracks of certain explorers, who not only went to new places but also brought back accurate information. The little lines are labelled with certain names, such as Musil, Bell and Leachman; one or two of them are labelled Godsave. Exploration was not Squadron Leader Godsave's chief job, but as the results of this side-line of his work are deemed worthy of permanent record, we may well assume that what he has to tell us about his main duties—armoured cars—will be well worth attention.

LECTURE.

THE purpose of this Lecture is primarily to describe the methods adopted by the armoured cars of the Royal Air Force in Iraq and Transjordania when dealing with offensives of raiding tribesmen, preventing counter-raiding and assisting the civil administration in its task of bringing the inhabitants of these undeveloped countries to a more settled and peaceful life by the prompt and just punishment of rebellion and brigandage. It is proposed, therefore, to relate some personal experiences in order to illustrate various methods of controlling armoured cars, which, although perhaps novel, have already been tested in meeting the situations peculiar to the type of country in which the vehicles have to work.

Iraq and Transjordania are countries under Air Control, and it is important to note that the methods of handling cars about to be described are suitable for a mobile ground force operating in close co-operation with aircraft.

Air Control may be defined as a system of controlling an undeveloped country where the air arm is the primary force at the disposal of the commander. But so long as aircraft are the main force at the disposal of this commander, a small but extremely mobile ground force is desirable

to assist him by close co-operation; it is also essential that this force should be commanded by an officer with a thorough understanding of the capabilities of the air arm. The armoured car, by virtue of its mobility, fire power, and the moral effect it exercises on the native mind, is particularly suited to this role. The aircraft thus constitute the force by which, in the last resort, resistance is broken down, while the armoured cars fulfil an auxiliary role, working, as it were, in the shadow of the aircraft.

The Country and the People.

Before describing the tactical handling of the cars, a brief description of the country and its peoples will assist in an appreciation of the problems with which the armoured car commanders were confronted.

The desert lands of the Middle East and Arabia may be divided into three main varieties, distinguished according to their surfaces, as Steppe, Sandy and Stony.

Steppe desert consists of vast tracts of hard gravel, plain or undulating, with a permanent coarse vegetation in the hollows and occasional water holes.

This is suitable for the operations of armoured cars, since the latter can be driven at speeds as high as fifty or sixty miles per hour over the major portion of its surface. There are, however, areas in which the gravel is soft and into which the wheels will sink. This will reduce the speed of a column and handicap mobility. One great drawback of this type of desert is the excessive amount of dust which a motor vehicle raises thereby giving away its position to the enemy, also causing the personnel considerable discomfort. Again, during the rainy period, the gravel and hard mud surface of the Steppe country becomes soft, and heavy vehicles will sink in. Lastly, the steppe country is broken by *wadis*, often with steep sides and soft sand or shingle beds, which can, however, be negotiated by motor vehicles at the expense of some manual labour.

The monotony of this country is usually broken by groups of more or less connected oases, where live small settled communities. These oases form a chain of perennial wells, which are of considerable importance in desert warfare.

The true *sandy desert* is a continuous area of deep sand, forced by the pressure of the wind into high sand billows or dunes, which are impassable to any form of wheeled traffic.

Yet another form of sandy desert occurs at intervals in the steppe country, where it forms parallel sandy belts of varying width, usually

covered with scrubby vegetation, and difficult to cross with motor vehicles though not impassable.

There are two types of *stony desert*: (*a*) volcanic, and (*b*) flint, or granite. Both can be crossed by motor vehicles, but speed and mobility are handicapped, while the wear on tyres is considerable. The constant passage of vehicles in the same track, however, tends to make a road with a passable surface in stony desert.

The *people of the desert* are nomad tribesmen, the Badawin or true nomad, who despise all others whose mode of life differs from their own. These tribes, by ancient custom, have the right to raid each other.

The objective of a raid is usually loot and, in the case of certain fanatical desert tribes, a desire to spread the true faith by the sword. Normally a raid does not entail large casualties, but the raids of the Akhwan of Nejd, whose object is to purify Islam, are particularly blood-thirsty affairs. No quarter is given, and the victims are mutilated in a horrible fashion.

Desert tribesmen are generally mounted on fast riding female camels, and are extremely mobile. A raiding party moving to the attack or in retreat is able to cover a distance equal to that from London to Brighton, say fifty miles, in twelve hours. They are armed with modern rifles, shoot from the saddle with a remarkable degree of accuracy, and carry all supplies, even for a long-distance raid, except water. From this it follows that wells are important strategical points in desert warfare, as the tribal leaders must of necessity plan their line of march according to the wells. The armoured cars can, therefore, seriously embarrass the enemy by making use of superior mobility to hold wells and cut him off from his supplies.

The tribesmen in battle rarely employ shock tactics. Their favourite manœuvre is to adopt a crescent formation with the war banner of the leader in the centre. Though apparently a loose formation, it is not lacking in cohesion and threatens the flanks and rear of the opposing force.

The Control of Cars and Their Fighting Formations.

During the period under review, from 1924 to 1929, the armoured car units of the Royal Air Force were equipped with Rolls-Royce armoured cars, armed with a Vickers .303 machine gun in the turret, and carrying a Lewis gun stowed inside the turret for use in dismounted action or for high angle fire from a yoke mounting on the rear of the turret.

The normal fighting crew was three. Sufficient fuel for a journey of 350 miles with water and rations for seven days was carried in the column.

The W/T tenders were wooden box bodies mounted on Rolls-Royce chassis; these carried the signal gear and spare petrol, oil, food and water, together with a crew of three.

The columns were also equipped with Ford cars with an open wooden box body and a Lewis gun mounted on a scarf ring. These were used as light armed tenders.

The crews of all cars were trained, and frequently exercised, in car drill, the object of which was to enable the commander of the column to adopt a fighting formation giving him maximum fire power and mobility with a minimum of delay.

In open desert country a column of armoured cars is similar to a squadron of aircraft, or more so, perhaps, to a flotilla of destroyers. It is controlled by the commander by flag signals from a leading or flag car, so that he may join action with his cars disposed in the most suitable formation. The signals for action stations and dispositions are simple, consisting of easily remembered single flag signals. The control of the individual car will be mentioned a little later when reconnaissance and survey are described.

A column of armoured cars moving in hostile country was so disposed as to maintain a screen of armed Fords, three in number, whose duties were to act as scouts, establish contact with the enemy, protect the advance and flanks of the column and prevent the commander taking his heavy armoured cars into soft country where their mobility would be handicapped. The distance at which this scout screen proceeded ahead of the main column was dependent on the features of the country, an average of 800 to 1,000 yards answering the purpose. One armed Ford, in addition to the three, acted as a communication car.

Leading the main column, which moved in line ahead, came the commander's flag car, closely followed by the battle section, commanded by the second in command. At a distance of 500 yards in rear of the last car of the battle section came the reserve and H.Q. and W/T tenders, with an armoured car of the reserve as rear guard. The number of cars in the battle section and reserve was of course dependent on the strength of the column.

Ahead and to the flanks were the aircraft.

When contact was made with the enemy, either by the aircraft, who reported by dropping a message on the flag car, or by the scout screen, who reported by firing one red Very light; the flag car flew the

signal: "Action stations—battle section to the front." Armed Fords immediately turned about, and proceeded with all speed to join H.Q., the leading Ford proceeding via the flag car so as to report verbally. The flag car turned to the right, out of line, and battle section went to the front with all speed, the commander of the battle section taking command. H.Q. halted, and the armed Fords afforded them protection. The W/T mast was erected and communication with aircraft and base established.

The armoured cars of the reserve joined the commander's flag car; the commander then held his reserve under his hand, manœuvring to keep the action under observation and throw in his reserve as the situation demanded. The commander of the battle section disposed his section according to the enemy's formation, so as to obtain the maximum fire power, using either line ahead, line abreast, or, the most suitable formation for dealing with an enemy in crescent formation, namely, a Vee disposition giving an all-round field of fire.

The movements required are very simple, and can be controlled by single flags. For example: if the battle section advances in line ahead and is attacked from the left flank, the commander flies "all cars port 90°" and fires a red light. Each individual car turns 90 degrees to port and opens fire, thus advancing upon the enemy in line abreast. The cease fire signal, one green light, and the flag signal: "all cars to starboard 90 degrees," will bring the column back into line ahead again, while a single flag signal will bring the cars into Vee formation.

The commander of the battle section should exercise his superior mobility to keep the enemy at a distance of about 200 to 300 yards, never permitting him to close with the cars. Car commanders, by careful fire control, should fire short bursts from the halt, moving on to halt and fire again, thus obtaining greater accuracy and economy in ammunition. Meanwhile, the column commander establishes his headquarters and reporting centre with the W/T tenders, while maintaining touch with the aircraft, who are taking air action.

The ideal method of operating against raiding tribesmen, where the circumstances permit, is the combined use of a force of aircraft and armoured cars working in the closest co-operation, communication between ground and air being maintained by W/T or visual signalling. The role of the aircraft is to locate the raiders, break down their resistance, and disorganize them by air attack, while that of the armoured cars is to round up the fugitives, arrest the leaders, and drive the rank and file back across the frontier or into their own area. The cars can also deal with any isolated parties who have escaped notice from the air.

In cases of small raids, where it may be more desirable to effect arrests than to inflict casualties, the tactics adopted should enable the aircraft to locate the raiders and direct the armoured cars to the scene by signal. The moral effect produced by the aircraft and the arrival of the cars in fighting formation is usually sufficient to secure a surrender, except in the case of tribesmen like the Akhwan, where religious fanaticism may drive them to attack.

In almost every case the tactical problem involved is that of pursuit and interception, a problem made more difficult by the fact that the leader of the raiders will spread his force out over a large area.

It will be observed that the terms "port" and "starboard" are used instead of left and right, and the reason for this is that the monosyllabic orders left and right, given above the noise of engines and gunfire, caused confusion; greater rapidity of manœuvre was obtained by the use of "port" and "starboard." Drivers were also trained to drive on the orders of the car commander, and these consisted of speed and course orders. For example: "Go ahead—ten" indicated that the driver was to drive forward at ten miles per hour on a straight course. To direct the change of course the orders "port" or "starboard" followed by the number of degrees of turn of the wheel were given. Consequently, on the order "Port five" the driver turns his wheel to steer the car to port through the smallest possible angle, and remained turning until he received the order "steady," when he straightened up and continued to drive straight until further orders. It was thus found possible to direct a car on to a target within very fine limits, to manœuvre a number of cars with ease, and, what is perhaps more novel, to steer a car by compass over open deserts for hundreds of miles on straight and accurate courses. Eventually, by this procedure, it was found practicable to survey many hundreds of square miles of hitherto unexplored country, and produce sketch maps made from compass triangulations with an error as small as three per cent.

Reconnaissance and Survey.

One of the primary tasks of armoured cars in an undeveloped country, where difficult, "semi-peaceful," conditions prevail, is reconnaissance and the making of tactical roads. This duty can well be combined with that of showing the flag to the tribal people, and is part of the collective training of any armoured car unit.

Since it is always in close co-operation with aircraft, an armoured car column can be refuelled and re-rationed from the air, and can thus remain away from base in the desert for some weeks. Mechanical breakdowns are dealt with on the spot, the necessary spares being trans-

ported by air. To illustrate what can be done two cases may be mentioned :—one, where a complete new gear box was fitted to a Rolls-Royce armoured car in the Northern desert in a daily shade temperature of 110 degrees F., which operation was completed in fourteen working hours ; and a second case, where a complete set of big ends was fitted to a Rolls-Royce in the Southern desert in forty-eight hours.

The moral effect of armoured cars on the tribal people is considerable, and is enhanced by frequent patrols into areas where such vehicles have not previously penetrated. Armoured cars have frequently obtained bloodless victories, and raiding parties have surrendered on their arrival. Even though the constant patrolling of the deserts was a thankless task, imposing great strain on the personnel, there is no doubt that the presence of the armoured cars in the desert during the Akhwan operations of 1927, 1928 and 1929 prevented many incursions by the Wahabi warriors into the territory of Iraq. Indeed, it is only fair to the N.C.O's and men of the armoured cars to record that, although they did not have the satisfaction and glory of a general action, their work—and very fine work they did—was rewarded by the knowledge that they had kept the desert clear by the unceasing vigilance of their patrols.

A number of surveying reconnaissance expeditions were undertaken between 1924 and 1929, the most noteworthy being those of the Iraq–Nejd frontier, the Iraq–Syrian frontier, and the Iraq–Transjordan frontier, the Shatt al Kharr area, and the great Shammiyah Desert. Maps of these areas have been compiled from the data obtained by the armoured cars. Moreover, by " showing the flag " on these expeditions the armoured cars were able to establish friendly relations with the nomad tribes of Iraq, and during 1928 and 1929 to restore confidence in the Shammiyah Desert when the tribes were apprehensive of Akhwan raids. The tribesmen were particularly interested in the close co-operation between the aircraft and the armoured cars, and the fact that the armoured car commander could call up aircraft at will created a deep impression.

As an example of our relations with the Sheikhs of the nomad tribes, Sheikh Fahad beg ibn Hadhal, the paramount Sheikh of the Amarat Tribe—he was a man of great age, some ninety summers, to use his own expression—who had travelled in the desert with armoured cars, asked that we might bring him a doctor when he lay dying in his tent in the desert. We were able to reach him, and he consented to being brought into Baghdad by aircraft, where it was hoped attention in hospital might prolong his life. An aircraft, a Vickers Victoria, was directed by W/T to the Sheikh's encampment, and he was emplaned upon a stretcher and flown to Baghdad where, in his dying condition,

he asked to speak to the pilot, and said " This is my first and ' insh Allah,' probably my last ride (to use the literal translation) in the belly of the great bird, and I have enjoyed it, and wish to thank you and ' the father of the motor cars.' " Unfortunately, his life could not be saved, and he died the next day.

Typical Operations.

The problems involved in these desert operations are best illustrated by a few actual incidents.

In 1925 the Overland Desert Mail from Baghdad to Damascus was attacked three times in Syria by brigands, when passengers and drivers, all British personnel, were killed or wounded. It was, therefore, decided to divert the mail through the Transjordanian Corridor, and to patrol the route from Amman to Baghdad with a section of armoured cars. Throughout the very wet and trying winter of 1925–1926 a continuous patrol of 450 miles—roughly the distance from London to Aberdeen—across some of the worst type of lava desert was maintained, with the result that no further attack was made upon the mail convoy.

In 1926 a raiding party of Shammar, from Syria, some 200 strong, raided into Koweit, a distance of about 600 miles. They took many months to do this journey, but eventually captured several hundred camels in the neighbourhood of Koweit Town. On their return journey they were considerably harassed by aircraft, and broken up into small parties, while armoured cars were despatched from Baghdad to intercept the parties in the Western Desert.

The tactical problem confronting the commander of the armoured cars was to move his column 250 miles over moderately good desert country, and so dispose his aircraft and cars that none of the small bodies of raiders moving in country broken by hills about 200 feet high should escape. Finally the raiders were intercepted 40 miles East of Rutbah, where an action took place, in which the enemy occupied the crests and reverse slopes of hills from which they were dislodged by the fire of the armoured cars and of the co-operating aircraft. They suffered casualties to the extent of 29 killed and 26 captured. This drastic action undoubtedly had a strong deterrent effect, and no further raiding took place during the year.

Early in May, 1927, a party of 150 Huweitat from Syria entered Iraq to raid the Anaizah, and a combined column of armoured cars and a flight of aircraft moved into the Western Desert with orders to intercept the party. The leaders, however, heard of the presence of the cars and returned to Syria, but again entered Iraq later in the month. On this occasion the armoured car commander made a forced

march of 225 miles (almost as far as from London to Darlington) across mixed desert country, 120 miles of which were covered at night, in eighteen hours. He was thus able to occupy a wadi in which—according to native report—the raiders were making their march. Early next morning the raiding party was observed on an open gravel plain, and the cars disposed in Vee formation moved out to attack. A burst of fire from the leading car was fired into the ground to a flank whereupon the leaders immediately surrendered, the object of the column commander thus being attained by the moral effect of the armoured cars, which had surprised the enemy by the speed of the forced march.

In the above examples conditions were favourable to the armoured cars, but an illustration of the difficulties of adverse weather and unknown country is supplied by one of the innumerable operations in Northern Nejd in 1928, namely that of the occupation of the desert well of Al Hafar.

In March, inteliigence reports all pointed to a concentration of Akhwan, whose object was stated to be the Basrah district. At that time the Royal Air Force, in co-operation with the Royal Navy, had established a base at Koweit with two sections of armoured cars and a flight of aircraft. In order to embarrass the march of the Akhwan it was decided to hold the well at Al Hafar, which was the key to the eastern section of the Southern Desert. Lying in the hollow of the vast wadi of Al Batin, which runs from Nejd to within striking distance of the Basrah area, it was the last watering place prior to an attack in this area. As it was understood that a large force of Akhwan were advancing on Al Hafar, two sections of armoured cars were ordered to proceed to Al Hafar with all speed and hold the well. The commander was informed that he would be supported by two flights of aircraft, and the column left Koweit early in the forenoon. A strong hot easterly wind was blowing, and the initial course was westerly across a sand belt which surrounds Koweit.

Seven hours were needed to cross the fifteen miles of sand belt, and each Rolls-Royce radiator consumed about eight gallons of water. The passage of the sand belt was made on strips of wire netting of two-inch mesh. Nightfall found the column only 55 miles out, in unknown country, near Al Batin, while surrounding thunderstorms made W/T communication impossible. At sundown the gale increased in force and thunderstorms continued. The column advanced through soft, sandy country, down the eastern bank of Al Batin, in third and second gear most of the time. At 8.45 a.m. an unsuccessful attempt to communicate was made. The commander was, therefore, without any intelligence, while the gale and storms prohibited air reconnaissance ahead of the column.

The column advanced with a scout screen of armed Fords, carefully examining the wadi and undulating country for the enemy. At 3.30 p.m. the column entered Nejd, when further thunderstorms prevented communication. The commander was then faced with this problem. If the column proceeded to Al Hafar, it would arrive there with only sufficient fuel for a further 20 miles and no water, as the continual use of low gear in the soft sand had reduced petrol supplies and the continual hot following wind caused all radiators to boil until each Rolls-Royce had consumed 14 gallons of water since the start. If, as there was reason to believe, the enemy were occupying Al Hafar in force, the commander ran a grave risk by arriving there with what would be an immobile column. It was, therefore, decided to form a defensive camp 50 miles from Al Hafar and to await supplies by air.

In the evening H.M.S. " Enterprise," lying off Koweit, broadcast a signal which was received, and she was able to receive a position signal from the column, which was duly passed to headquarters. W/T communication was then re-established during the early hours of next morning. Having been refuelled by air, the battle section, plus one W/T Tender, proceeded with all speed to Al Hafar, while three flights of aircraft joined the column. Al Hafar was not occupied by the Akhwan. But it was afterwards learnt that the moral effect of the movements of the column in the desert had deterred the leaders from continuing their attempt.

The Future Vehicle.

A question sometimes asked is: " Why are heavy armoured cars necessary in these difficult desert places, and would it not be better policy to employ light armed cars whose mobility would not be handicapped to the same extent by the soft desert sand ? " To this query I would reply that my opinion is that the fully armoured vehicle is necessary as a weapon to counter tribal raiders because of the great moral effect it exercises on the native mind. The few examples quoted above have shown that the presence of armoured car columns in the desert has prevented raids, and that the raiders have surrendered at the approach of armoured cars, and many more examples of this moral effect could be given. The native does not stand in awe of a light armed car since he realizes that it is unprotected; so that the presence of light armed cars in the desert exercises but little moral effect.

It is also within the bounds of probability that, with the advance of civilization in the desert, the tribal leaders may be able to equip their raiding parties with light armed motor cars, and that a car versus car action in the open desert may be fought. It seems, therefore, very necessary to maintain fully armoured cars for desert warfare. It must

be remembered that the ideal vehicle is one which possesses mobility superior to that of the trotting camel in every type of desert country. To attain this ideal it appears that a combined wheeled and tracked vehicle may solve the problem of the passage of soft sandy country.

DISCUSSION.

FLIGHT-LIEUTENANT PIGGOTT asked if the Lecturer could say something about the type of car which he thought most suitable for the sort of work he had described.

THE LECTURER:

That is rather a difficult question to answer off hand, as I am not quite in touch with what is going forward in this respect since I came home. My personal views are, however, that we must have a six-wheeled vehicle, with an engine of not less than 100 horse power. The weight should be kept down as far as is consistent with the requirements of the desert, but the vehicle we must aim at for this desert work is one that has the speed of a trotting camel in every type of country. Normally, the trotting speed of a camel is of the order of about ten miles an hour, but he will go continually over soft and sandy country where the cars may have to make a big detour to get round, or may even get bogged.

It is possible that the solution may lie in a wheel-cum-track device, but whether tracks will work in the desert country is, I think, a matter for experiment.

THE CHAIRMAN:

When I was commanding in Iraq recently I was struck by the extraordinary reliability of the armoured car sections out there. One gave orders to an armoured car section, perhaps by wireless late one evening, that by 3 o'clock on the next afternoon it was to be at some place a hundred or a hundred and fifty miles away. One never worried about it any more, because one was always sure that it would be at the given spot at the given time.

A photograph which the Lecturer has shown us gives but a faint idea of the appalling conditions which these cars frequently have to meet, and the fact that they always get to their destination reflects great credit not only on the commanders of the sections and the personnel under them, but on the designers and makers of the vehicles, of the tyres and of everything else connected with them.

Another point that was impressed on me in Iraq is that we have as yet barely touched the fringe of the possibilities of mechanized warfare, if one may include in that term aircraft as well as armoured cars and tanks. Here in England we get lectures and read handbooks and think that the last word has been said about what armoured cars or aeroplanes can do; but out on operations one constantly comes up against some new problem, the solution to which is found by applying the potentialities of these machines in some manner which had never been thought of before. It would be very unwise to suppose that we are anywhere near finality in learning how to use the instruments now at our disposal even when employed separately, still less how to use them in combination.

The customary vote of thanks to the Lecturer and Chairman were carried by acclamation.

THE POTENTIALITIES OF AIRCRAFT IN NAVAL WARFARE

By "Lieutenant R.N."

NOBODY can have followed the erudite pursuit of History, even for a pastime, without being struck with the fact that war is a very chancey business. It is possible in peace time to observe some of the factors which may affect the use of new material; and when a new thing is in the process of development, there are those who take some of the available evidence, and base upon it such a well argued theory that very many will tend to accept it. But it is a most dangerous thing to allow policy to crystallize round a theory which owes its acceptance to strong argument as much as to strong evidence. The element of dialectic skill being ineffective in war, it will betray that theory in the test. The accepted theory regarding the various limitations of the air arm, it is thought, outstrips by a great way the evidence of limitation.

Time and again old tactics and weapons have been modified in conformity with past experience, tried in fresh circumstances and found inefficacious. The impudence of being dogmatic on the subject of a growing new arm is all the more dangerous, whether in praise or disparagement, when year by year fresh possibilities perplex the issue, when even the fundamental principles of war have degenerated from maxims easy to apply to any case into vague generalizations covering a mass of growing possibilities. Even in his day Clausewitz was reduced to the enormous truism, that the forces having at the decisive point a crushing superiority would win.

The difficulty which made him trite, in order to be true, is greatly increased at the present day. It is the difficulty of telling anybody what, in fact, will constitute force. When the guns of opposing armaments differed mainly in weight, and perhaps a little in the matter of their powder, it was easy enough for a general to apply the French formula that "the moral is to the physical as three is to one," or the English dictum that "one Englishman is equal to five Frenchmen,"

and so determine the quantities required for a crushing superiority. But nowadays to be dogmatic is to ask to be shown overweening and premature. In addition to the infinite possibilities of circumstance, grow the increasing possibilities of new weapons.

For instance, British opinion may rather despise the aerial bomb in battle at sea; but there is no reason to believe that the Americans despise it. And although we were to strike it out from among our denominations of force, the Americans might not only retain it but use it very effectively. And a lucky bomb dropped under the most favourable, but under quite possible, circumstances into the most vulnerable part of a valuable ship may do a great deal of damage. The explosion might cause the ship's navigator to make just such a slip in his dead reckoning as so perplexed the Commander-in-Chief before Jutland. One only says it might.

It has been laid down dogmatically—not at the Admiralty, perhaps, but in wardrooms—that fighting aircraft are of little value directly against surface craft, particularly heavy ships. But there is no assurance that the Japanese, for example, are so aware of this disability. The Japanese War Staff may conceive that an aeroplane loaded with explosive, striking a turret or the conning tower of the enemy's flagship, would do a great many times its own worth of damage. And if twenty-five or thirty Japanese pilots were required to carry out this form of attack there is no doubt that they would be found, and no one can have watched a dummy attack by fighters on surface craft without remarking how much easier and how much more dangerous for all concerned it would be if they flew into the ship instead of narrowly escaping.

But the point is that aircraft have untested possibilities, which should be remembered before believing too firmly in a dogmatic theory based on a few, though proven, facts.

Apart from the trend of thought in foreign countries, which it is always possible to miscalculate, there is a definite ignorance among certain naval officers, dangerously gifted and dangerously well informed in other respects, upon the powers of modern aircraft as such; and this could be removed by observation. Laborious hypothetical calculations have shown them, for example, the number of guns confronting any aircraft penetrating to the centre of a hypothetical British battle fleet in cruising formation, and the deduction which they accept is that no aircraft could do it. The writer will wager at any time, however, that a flight of fighters ordered to attack the centre of nine ships spread at five-mile intervals will do so without being in sight from the ships for more than two minutes; and that during that time not more than one-third of the ships' A.A. gun power will be brought to bear on them.

Attacks of this sort, with a S/R machine to navigate, may be carried out at great distances from the carrier. However persistent the faith of the observers, pilots nowadays have rightly much more confidence than at one time in an observer's ability, in cloud or above the cloud horizon, to keep an accurate dead reckoning line: an achievement of tactical importance, which yearly moves towards perfection. The only answer from a ship to aircraft manœuvring above low clouds to attack is a dignified silence.

It is not, in the least, the intention here to set up a new theory of the value of aircraft. It is simply to suggest that there is no universally accepted theory at present, conformable with possibility and available evidence: and that a great deal has been achieved against aircraft by strong argument and weak imagination. Dialectics may damage our own Air Arm in peace time, but it will not harm enemy aircraft in war. It is a matter of common experience to sight an aeroplane right overhead, and two minutes later to wonder where in the world it has gone. This is a point from which innumerable speculations can start, not considering the special case of the instinctive habit, inculcated and fostered in British seamen, of keeping a smart look-out *ahead* for the fleeing or inadvertent enemy, whom their ancestors delighted to discover always in that direction. Aeroplanes are frequently not sighted, even when they are visible and expected.

Over and above the fact that a great many elements of force are incalculable, and the fact that a great many more await further unbiased investigation, it must have been observed how in the past an element even of known value has suffered unexpected appreciation or depreciation due to circumstances. For instance, H.M.S. "Good Hope" mounted a certain number of destructive guns, but could not open the casemates to fire all of them. Very much more may weather affect newer, smaller and more manageable aircraft carriers, on board which aircraft may be rendered totally unmanageable on a day when the "Furious," for example, would be sending up flight after flight with monotonous regularity, even in a swell without wind which moreover, might, preclude the handier ship from steaming at the speed required to give the air flow necessary for flying off.

The use of weapons whose intrinsic value we have not yet fully gauged must depend still further upon circumstance. And one would like to suggest that opinion on the limitations of aircraft is often much too decided.

Insufficient interest is taken by the great body of naval officers if the question is to be hammered out as it could be; and strong arguing has forced the acceptance of a pleasantly conservative theory. Interest

will not advance without information. They go together. It is remarkable now, when the Fleet Air Arm has existed for six years, how few officers will tell a fighter formation and a S/R formation apart, at a distance of two miles; let alone distinguishing a British from a foreign type.

It is suggested that tactical data in a readable form should be circulated together with pilots' and observers' accounts of fleet exercises as illustrations thereto. This would be of special advantage to all officers who are not able to benefit by practical or verbal instruction. It is further suggested that as much publicity be given to the difficulties of identifying our own aeroplanes from enemy machines as is now given to the wonders of scientific H.A. weapons waiting to deal with the latter, when distinguished; and to similar practical problems and perplexities of the anti-aircraft specialists.

MODERN COMMUNICATIONS AND COMMAND

By CAPTAIN F. S. MORGAN, Royal Signals (S.R.)[1]

THE years immediately following the Armistice were occupied more with demobilization than with any thought of preparation for war. It was a period of reversion to permanent rank for commanders and staffs, of a return to normal peace routine for the troops. It was during this period that the Royal Corps of Signals was born of that fissiparous body, the Royal Engineers. That re-organization seemed to open a new era in the attention bestowed on communications.

When at length the issue of "Infantry Training (1926)" was made, it seemed as though the more salient intercommunication lessons of the War would be found embodied in our new doctrine of training. Military students, however, must have been grievously disappointed on turning to the index of the new manual. Reference to "signals," "telegraph" or "telephone" yielded nothing; neither did "cable" nor "visual." "Flags of truce" and "flags, signal, nature and use of, with tanks" were hardly what was sought. So one came to "intercommunication," which had six references. But the merest glance at these references soon dispelled the illusion that "signals" and "intercommunication" are synonymous, for of the three named methods of liaison between infantry and artillery, personal intercourse occupied the two chief places, and the third—signalling—was left in the glory of that one word.

The next pair of references was devoted to communication between air and ground; and the final references, after assuring us that "it is only by the most careful arrangements for the passing of information that victory can be achieved," fell back on orderlies and still more orderlies—"other means," it was stated, "are often impracticable within a battalion." Yet there existed a battalion signal section, for they were instructed not to carry flags on parade.[2] So we were forced to conclude that the function of this section, as no other duties were even hinted at, was presumably to supply Verey lights, which are "one of

[1] This article follows on that entitled "The Development of Communication and Command," by the same author in the JOURNAL for February, 1931, p. 128.

[2] Infantry Training (1926), Vol. I, p. 216.

the best means of communication in the defence, against an enemy using smoke."[1] One could only assume that all the telephonists had been smothered.

From Infantry Training we turned to Field Service Regulations (1924). This work mentioned :—

(*a*) the position of headquarters as affected by the communication, repeating the emphasis on personal propinquity ;

(*b*) the importance of communications in the defence—a matter left to Verey lights by Infantry Training ;

(*c*) communication to picquets in mountain warfare ;

(*d*) communication along a column on the march.

But all these references were of the general form " communication should be established " and failed to supply any specific guidance, while nowhere was the relation between command and communication discussed, nor are any general principles laid down for its establishment. In fact, the official volumes of that date appeared content to relegate the matter from the sphere of " actual military operations," which is the subject-matter of Field Service Regulations, Volume II, to that of organization and administration. It is true that in Field Service Regulations, Volume I (1923), whither the student had followed, faint but pursuing, a chapter was devoted to " Intercommunication in the Field," sandwiched between a chapter on the format and wording of orders and another on office working, stationery and returns. So it was perhaps as well that our student was only required to know the value and limitations of air photography, the system of collecting and evacuating wounded, the R.A.S.C. system of food and ammunition supply, and the technical handling of cavalry squadrons, artillery batteries, R.E. companies, tank sections and the inevitable infantry battalion. For if signals were mentioned, it was always styled a " detachment," which might or might not include cable or wireless equipment, so that only a few despatch riders could safely be assumed to exist. In other words, we found once more our old friend of Infantry Training, the orderly, now mechanized. Yet a faulty system of communication is as likely to cause disaster in war as a wrongly sited machine gun or an inadequate reserve.

Such was the state of official teaching until 1929, when the publication of new Field Service Regulations, Cavalry Training and Artillery Training came to mark a very considerable change.

Cavalry Training naturally approaches the subject from the standpoint of the collection and transmission of information, pointing out that

[1] Ibid., Vol. II, p. 51.

the time taken for the information to be delivered " in time for the commander to profit by it before the situation has changed " controls the distance at which reconnoitring forces can operate.[1] It further suggests the use of aeroplanes for liaison with a flank guard in default of report centres at pre-arranged times and places ; it restrains the natural desire to destroy all enemy equipment by the consideration that enemy communication material may be of use to their own forces.[2]

Among the training manuals of the individual arms, however, the Tank and Armoured Car volume stands alone in treating the communication system as a whole, emphasizing the duty of close co-operation with Signals on the part of tank unit commanders, so that for their own part they may take advantage of the signal network to keep in touch with co-operating arms and with their own repair and supply organizations ; while in return they should avoid doing unnecessary damage to airline and cable routes in the area of tank movements.[3]

When we turn to the new Field Service Regulations, we find that the chapters which, in the 1924 edition of Volume II, dealt with Quartering and Ammunition Supply are now relegated to the more appropriate first Volume, and are replaced by an enlarged chapter on Orders, Reports and Messages ; while the chapter on " Intercommunication " is amplified, moved from Volume I, and brought into its logical place, that is, into the Volume on Operations. In addition to this special chapter, nearly every page also emphasizes the effect of communications on operations. We thus find that the Index references have risen from six in 1924 to twenty-three in 1929.

As a concrete example of this development let us take the subject of rearguard action, that most difficult operation of war. The Regulations of 1924 merely advised that the rearguard and main body should " *periodically* keep each other informed of their progress." Infantry Training of 1926 instructs the rearguard commander to " send *frequent* reports." Cavalry Training of 1929 provides for at least the possibility of continuous touch, by stating that the rearguard commander should be told " the axis of communication along which he should move." But Field Service Regulations are most emphatic in saying that " the first requirement is information " and that " constant and reliable intercommunication is essential." Here, in theory at least, the vital influence of intercommunication has at last been admitted into the general doctrine of war training.

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[1] Cavalry Training, sections 3 and 15.

[2] Ibid., section 6.

[3] Tank and Armoured Car Training, section 28.

But the position is not so satisfactory when we turn from the doctrine in accordance with which the Army is led in war " to the principles on which it is " trained in peace."[1] In the annual programme the time available for combined training—in which alone staff, Signals *and* units can practice together—is normally at best only a few days. Moreover, the value of these few days is to a large extent discounted by the natural desire of commanders to supervise their commands as closely as possible. Staff and private cars to the " battle line " are a symptom of this desire; they are undoubtedly regarded as the quickest way of obtaining " early, accurate and reliable information "—on manœuvres. But this is hardly an image of war, and the practice must at once bring about an unfair comparison, while it forms a waste of the brief opportunity for Signal Training. The same objections seem to apply to the use of the civil telephone system on manœuvres, more especially when it is employed between two forces which are separated by " enemy " detachments through whose area run the civil lines in use. After all, manœuvres as a whole, as distinct from specific tests of new equipment or of experimental organizations, are largely devised for the mutual training of staff and Signals in their relation to dependent units and to each other.

In one very important respect the Royal Corps of Signals occupies a curious position. A brigadier can inspect the training of his battalions and criticize effectively from his own knowledge : so also can a divisional commander, though he may be by training an infantryman, cavalryman, gunner or sapper, since infantry tactics are the basis of all operations. The technical skill of the divisional gunners or sappers are the spheres of their respective commanders ; in any case their actual technical skill will rarely affect a division's combined training. But the position of Signals is very different ; for though there is no Commander, Royal Signals, to keep in touch with divisional headquarters throughout the year, the technical signal work will immediately and intimately affect the division as soon as combined training commences. In fact, from the Signals point of view combined training has a very distinct resemblance to actual war, devoid indeed of casualties due to enemy action, but on the other hand subject to the severe peace handicaps of shortage in establishment and inadequate or experimental equipment.

There is, in addition, the unreal speed of movements, when assaults are unchecked by bullets, and a mobility—not to say fluidity—of the various headquarters. The gunners will not be required to hit their targets, nor will the sappers be asked to demolish a main road bridge to delay oncoming tanks : but Signals *will* be asked to provide " constant

[1] F.S.R., II, section 1.

and reliable communication" and to use their technical equipment to the limit of its capacity.

There is a further point in which the position of Signals is unusual: in that it is the only corps whose junior officers and other ranks can normally come into direct touch with commanders and staff officers other than their own immediate superiors. So it may happen that an assistant adjutant, who might be most sympathetic with one of his own machine gunners whose weapon was temporarily out of action through no fault of the man himself, will become positively vitriolic down the telephone if the exchange operator cannot immediately put him through to a distant office when the line is cut. Evil communications may corrupt good manners, but a little "sweet reasonableness" will make telephoning a pleasure to all—even the exchange operator. As a recent G.P.O. circular has it:—"The telephone service depends for its efficiency almost as much on those who use it as on those who supply it." We have to remember that it is a little difficult for an N.C.O. in charge of a brigade signal office to send back to the brigade-major a situation report one hundred words long and headed "to be sent by wireless" for revision. Nor may he have the opportunity in the stress of "battle" to point out that such a message will take at least forty-five minutes to clear, by which time the situation will have completely altered, and meanwhile both the brigade set and the corresponding one at division will be unable to handle other and possibly more urgent work while being immobilised.[1]

It is for the use of commanders and their staffs that the communication system is designed—a technical means at their disposal, just as the power of artillery to hit distant objects is another technical means at their disposal. But there exists this considerable difference that in communication the staff are as it were conducting their own "shoot," choosing the direction (address) and the projectile (text). Just as a barrage in mobile warfare is apt to be unduly wasteful and only obtained at the expense of aimed fire, so a barrage of multiple address messages is wasteful and hinders other and perhaps more useful transmissions. But while the actual gunners might be blamed for failing to secure a hit in a given number of rounds, Signals are not responsible for the amount of text expended to secure a given result. Yet, if W/T is the signal method of the future, brevity is the soul of W/T, whether in code, cipher or clear. When one wireless or radio-telephone set is working on a given wavelength all others on that wavelength must be silent; yet all sets that may have to communicate to each other—for instance, those with the advanced guards of parallel columns—must be on a common wavelength. "The limit to the brevity of orders is fixed by the trained

[1] This actually occurred during 1930 training.

intelligence of recipients. Napoleon's Marshals could move effectively in response to a couple of sentences: Mack's generals (at Elchingen) needed fourteen sheets of foolscap."[1]

Another difficulty encountered by Signals is that of the location of moving units. For it seems to be inherent in human nature for a commander to devote more thought towards controlling his subordinates than to informing his superiors of his actions and whereabouts. Under such circumstances only can the combined efforts of staff and Signals keep track of the more "fluid" units in rapidly moving operations.[2] But when it comes to pass that a brigade commander has to apply to the Signals office at divisional headquarters to ascertain the present whereabouts of his own brigade,[3] there would appear to be some need of improved liaison.

These particular problems, however, will doubtless solve themselves by practice under conditions of actual warfare; but there are other problems which cannot safely be left to war-time improvisation, on the well-known principle that "it will all come right on the night"; for a make-shift is frequently inefficient and invariably expensive. These newer problems have been introduced by recent developments in mechanization and increased mobility; and one of the greatest is the question of the use and the supply of field cable. Because it is possible under peace conditions—and advisable on grounds of economy—to reel up cable after use, Signals of all units and formations are equipped with the barest minimum. The fourteen miles of cable now allowed to a Divisional Signals compare curiously with the 13,000 miles laid out for the Battle of Cambrai in 1917—an average of nearly 2,000 miles per division, including lines already in use. As a consequence, the Signals officer postpones the laying of cable until "stable conditions" shall arise, being influenced in this decision by the possibility of a shortage later on, as well as by the certainty of having to spend time and labour in reeling-up. Yet there are many occasions when a more liberal use of cable would anticipate events and also prove economic, if not economical, while there is at least a strong case—granted an adequate supply—for laying cable along the line of an approach march, so that when the leading troops come into contact with the

[1] Encyclopædia Britannica: "Strategy."

[2] "One of the chief lessons derived from this year's French Army Manœuvres is said to be the difficulty encountered by the liaison services. Movement of mechanized troops is so rapid that units lose contact with their staff, and signallers have not time to establish their posts before a fresh move has been made. Even to establish contact by wireless takes at the earliest some ten minutes."—*Morning Post*, 26th September, 1930.

[3] This also occurred in the 1930 training.

enemy there is immediate and adequate communication back at the very time when it is most needed. This is equally the case whether the commander is in rear awaiting information, or well forward and anxious to send orders for the deployment of his following troops. That this is not done is due to the fear that at the end of a normal day's march there might be no cable left in the divisional cable-wagons. But there is no insurmountable obstacle to making the cable supply analagous to ammunition supply (a 30-cwt. lorry will carry forty miles of single cable), while the question of cost pales into insignificance compared with the normal running costs of armoured fighting vehicles.

For an example of an unexpected encounter battle that was lost because there was no communication between the advanced guard and the main body—the commander being up with the advanced guard—the student may be referred to the battle of Ethe, 22nd August, 1914.[1]

Another urgent problem is that of deliberate "jamming" of wireless by the enemy. The development of mobile columns operating on a wide front, or moving on parallel routes, inevitably leads to situations where portions of one's force are separated from each other, or from headquarters, by detached bodies or advanced groups of the enemy. Under such conditions cable is ruled out and despatch riders become unreliable, owing either to the danger of capture or else to the length of circuitous run necessary. Such long runs mean that the necessary acknowledgment or "proof of delivery" is not forthcoming for some time, if at all. Under these circumstances, wireless becomes the all-important channel of communication. But, if the wireless "route" lies over territory occupied by hostile forces, there is the probability that a hostile wireless set is within effective range. Such a set is frequently nearer to the receiving station than is the transmitting station with one's own detached or advanced force. It is consequently in an ideal position for "jamming." Questions of picking up the wavelength and relative signal strengths, as also of deliberately "flat" tuning to cover a greater waveband, are purely technical: but the question as to whether such a forward set would be more profitably employed for interception and/or jamming than for communication is for the commander to decide, depending as it will on the strategical or tactical situation, and the alternative means of communication available. It would, however, seem evident that when one force is keeping "wireless silence" for any reason—and therefore using other means for message-transmission—it might very profitably push forward one or two sets for the express purpose of disorganizing the wireless links of its opponents.

[1] "La Guerre en Action: Ethe." Lieutenant-Colonel A. Grasset. See also "Fighting Forces," October, 1929, p. 375.

That such a tactically " offensive " use of Signals has not—so far as the writer is aware—been tested in peace training is due either to lack of realization of its possibilities on the part of the General Staff, or else to a natural disinclination on the part of Signals to " foul their own nest." But this latter possible reason seems to be a case where *esprit de corps* is preventing valuable tactical training—training which might produce important guidance as to either the design or the handling of the equipment. It is also within the bounds of possibility that one or two specially designed sets might nullify all W/T communication within, say, a ten-mile radius; and such a possibility could hardly fail to react on the whole system of tactical command on a divisional front. Technical tests of this nature could be carried out with existing equipment.

A further problem introduced by recent developments—more especially due to the increasing activities of armoured cars and light tanks—is the siting and subsequent protection of headquarters. The space occupied by, for instance, a divisional headquarters tends to increase daily owing to the mass of mechanical transport involved. It is not excessive to estimate that divisional signals alone, when concentrated, may have up to twenty essential technical vehicles—and there may be as many or more belonging to headquarters and its attached groups. Accordingly, when the rival claims of ground protection and of concealment from the air are considered, there is ample scope for the skill of a camp commandant to dispose of all these vehicles. When the matter is further complicated by the necessity of spacing the active (or potentially active) wireless vehicles to avoid mutual interference, the various factors produce a formidable problem. But, since the technical efficiency of communication is obviously a primary consideration, it would seem to be arguable that the lay-out of the whole of the headquarters should be under the control of the senior Signals officer, who would be responsible that tactical and protective considerations should be accorded their due weight. If this be done, such an officer should undoubtedly be relieved from the administrative cares of a complex unit, and should become a " C.R. Signals " analogous to the C.R.A. and C.R.E. Another aspect of this problem of protection is presented when a headquarters or part of it, such as a report centre or signal centre, has to move. The 1930 manœuvres produced—for the first time (?)—the spectacle of headquarters, or even a single wireless lorry, being unable to move owing to the ubiquity of hostile armoured cars. At the same time despatch riders were rendered useless by the same agency. In at least two cases it was necessary to await an escort of tanks before moving.

Of course, the activities of armoured cars are usually apt to be over-emphasized on manœuvres, when road-blocks, mines and anti-tank

weapons are either non-existent or at best imaginary and dependent on the chance presence of a sympathetic umpire. Nevertheless it cannot be gainsaid that the armoured car possesses a distinct capacity for seriously disturbing back areas in mobile warfare.

When, looking into the future, we see certain prophets advocating command from the air, it is evident that they have completely ignored the Signals side of the question. For it is clear that, unless a commander is going to travel in a slow-moving air liner, a mark for every gunner within range, he will be deprived of staff assistance at his elbow: either he must do all his own staff work—which, as Euclid says, is absurd—or else his staff must be elsewhere. In either case, as there exists at present no means of erecting two W/T sets in an aeroplane, even if there were room for the necessary extra personnel, his single wireless or radio-telephony set will be in continuous use—a single channel along which must flow all the information and orders for the formation. But this continuous use means, as we have already seen, that only one other station can be kept in touch. Surely, it were better to keep a commander on the ground, assisted by his staff and surrounded by as many routes of communication as may be necessary, with air observers as well as with ground units. It would appear as though a special test of this method of air command, examined from this point of view, could be carried out at practically no cost, using mobile wireless sets to represent moving ground units, and sending a commander up into the air. Such tests might disclose unsuspected technical and tactical difficulties, not apparent under the artificialities of peace-training as now conducted, but which would become evident were the conditions to be made more realistic.

It may even be that we are in danger of having too much communication, and therefore too much "command" to the detriment of the subordinates' initiative, in which case a breakdown of communication would mean a collapse of the whole machine. For it is certainly true that a good system which suddenly breaks down will have a more demoralizing effect at both ends of the line than a system which provides comparatively scantier but more robust communication. For, under all conditions of war, communication *is* command.

EIGHT YEARS OF BRITISH CONTROL IN IRAQ: A REPLY

By "TAIYARI."

THE signing of the Treaty between Iraq and Great Britain last summer, signifying that a stage in the development of the country was drawing to a close, has focussed additional interest upon the course of events since air control was instituted in that region in 1922. It might be imagined that the fact of a mere eight years having been sufficient to reach this result could be regarded as a vindication of this "bold experiment," but "Jundi," in the last number of the JOURNAL,[1] believes otherwise. He appears to imply that no serious situation has arisen in Iraq since 1920, that the financial burden has been shifted from the shoulders of the Air Ministry to those of the Iraq Government, and that the Iraq Government forces have necessarily been expanded to make good inadequacies in the R.A.F. scheme. It is inevitable that events viewed from such an angle should seem distorted, and it is the object of the present writer to show how great he regards this distortion to be, rather than to attempt a detailed survey of this eight years.

To take the financial aspect first. It is implied that the Air Ministry, estimating a saving of £6,000,000 for their scheme as against that of the War Office, were guilty of prevarication in not including the cost of the Iraq Army or Police, which are paid for by the Iraq Government. Yet no one can ever have supposed that the War Office proposed either to pay for, or to disband, the Iraq Army and Police, as these existed long before the Air Force took control. In no part of the world, as far as the writer knows, where the Army is in control, have they done without the assistance of a police force in maintaining order. On the North-West Frontier there are Police, Frontier Constabulary, Khassadars and Chigas, none of which are paid for out of the military budget. The point is further laboured in a criticism of the comparison between the post-insurrection Army budget of £20,000,000 and the present R.A.F. budget of £1,500,000, "which does not take into consideration the

[1] See "Eight Years of British Control in Iraq," by "Jundi"; R.U.S.I JOURNAL, February, 1931.

cost of maintenance of the Iraq Army, 10,000 strong, nor of the Iraq Police, 8,000 strong." But it does include (and this is forgotten) a contribution of some eight lakhs towards the cost of the Iraq Army and also a part of the cost of the High Commissioner and his establishment.

The Iraq Army was established in 1921, and the policy of H.M. King Faisal and his military advisers has been to develop it in order that Iraq should be able to assume responsibility for internal security at the earliest possible date. This, not any inadequacy on the part of the R.A.F. and the Levies, is the reason for the expansion which has taken place since its formation. It is, incidentally, also the reason that the Iraq Police have been called upon to bear more than their fair share of tribal fighting, and to become, as " Jundi " puts it, " gendarmerie," so that the training of the Iraq Army should not be interrupted by petty expeditions. Nevertheless, the Police remain police, and carry out all the duties expected of a police force—such as suppression of crime, which in tribal society may always lead to fighting, supervision of aliens and control of traffic—at least as efficiently as other native forces in the Eastern countries of which we have knowledge. That they do so can hardly detract from the soundness of the Air Ministry's view that Army requirements eight years ago were excessive, if indeed there is any reasonable connection between the two points.

The reason for the expansion of the Iraq Army has been given above. The Police force also has expanded; but the total for the two forces given by " Jundi " is incorrect. The increase is from 10,500 in 1920 to 16,600 at the present time for the combined forces. The increase in Police has been the natural consequence of the expansion of the area under administration. Whereas under the Army regime practically the whole of Kurdistan was completely out of hand, now only two small areas are unadministered, and these have been voluntarily so left on account of the difficulty of finding administrative officials to run them after occupation. The total increase in cost to the Iraq Government has been £515,000 in this period, while a decrease of £2,500,000 has been made in the R.A.F. Budget. It is clear, therefore, that the expenditure of the Iraq Government has not correspondingly increased with the economies of the R.A.F.

Inaccurate figures are easily refuted by correct figures. It is less easy, in very brief compass, to deal with such airy statements as " during that time there has been no serious external or internal opposition to contend with," since this ignores the whole basis on which rest the Air Force claims for economy in control, namely, that their mobility and the rapidity with which they can act prevent affairs of small

importance in themselves from developing into serious opposition. There has been no lack of incidents of this type.

"Jundi" says earlier in the same paragraph that "the only area which might still give trouble was Kurdistan." It is true that the only area in which the military authorities, between the time of the suppression of the rebellion and the handing over of control, suffered a serious reverse was in Kurdistan, where a column of Indian troops was defeated near the Derband Pass on the Lesser Zab with serious casualties and the loss of parts of two guns; but it is untrue to pretend that anxiety after this date was confined to the Kurdish district.

In the autumn of 1922 the situation in the Middle Euphrates was particularly serious, and was only stabilized by intensive air action, which resulted in the complete pacification of an area over which no attempt to resume administrative control had previously been made. Political agitation continued, however, and a general feeling of unrest persisted and "assumed an aspect definitely anarchical," to quote the words of the Report on "Iraq Administration, April 1922—March 1923." It may safely be said that the effect of the action taken against the Samawa tribes, combined with the prompt arrival of aircraft on occasions when the situation appeared to be getting out of hand, prevented the development of a situation to all appearances no less serious than that of 1920.

The Turkish threat to Mosul may have been a bluff designed to influence the disposal of the Northern Province in their favour, but it was certainly not so regarded either by the Kurds or by the Arab tribes of the Euphrates, who were much influenced by false or exaggerated stories of Turkish strength and movements. It would certainly have ceased to be a bluff if their propaganda had been more successful with the tribes. It is also incorrect to imply that no Turkish troops could move over the Aleppo-Nisibin line (in fact thousands did move in both directions) or that this was the only possible line of advance. It was known that Sheikh Mahmud was in touch with the Turks at this time through their chattah-leader, Euz Demir, in Rowanduz, but neither side fully trusted the other, and the operations against the Sheikh were not, as described, a part of the operations to occupy Rowanduz but were subsequent to the occupation of that place.

Similar inaccuracies are found in the description of the Penjvin operations in 1927, in which the Iraq Army did not take an essential part but were included solely in order to give them experience and training; the Levies were sufficient to accomplish the object of the operations, which was to establish a police post and civil administration in Penjvin. It is stated in this same paragraph that on one occasion

" the co-operating flight of planes, unable to realize that a fight was in progress, took no part " when the Iraq Army column was engaged. It is a fact that no aircraft were there; but that aircraft can realize the situation and intervene without being called upon to do so was shown when some Levy cavalry were ambushed between Mowan and Serao by the Jaf Kurds in May, 1925, and were saved from a very serious reverse by the timely intervention of a flight of No. 1 Squadron aircraft.

To turn now to the operations in the Southern Desert; the arbitrary nature of the desert frontier and the provision of the Muhammara agreement regarding the erection of fortifications near the frontier are mentioned, but " Jundi " attempts to define the much discussed phrase, of which the generally accepted English translation is " in the vicinity of the frontier," as " the well-bearing areas in the limits of the frontier." This interpretation the words will not bear and, in fact, a high authority, not unconnected with the negotiations, has defined the words as forbidding the erection of forts or posts within rifle range of the wells on the frontier.

No serious attempt was made to penetrate the desert and control the tribes subsequent to the blockade measures which were taken during the War, until the air scheme came into operation. The progress was then gradual, and was inspired at least as much by the determination to put a stop to the depredations of Nejdi refugees in Iraq against Ibn Saud's subjects (of which Ibn Saud continuously complained) as by the desire to protect Iraqi tribes from raiders from the other side of the border. The decision to establish the Busaiya post was not taken until 1926 (Abu Ghar, some sixty miles nearer the railway, had previously been used as an advance intelligence post), but the very successful action of aircraft and armoured cars against a large raiding party of refugees returning from Nejd in the autumn of 1926 contributed largely towards stopping their activities.

After the savage attack on the half-constructed post at Busaiya, which may be regarded as a culminating point in the series of raids into Iraq territory, although it was the first blow struck directly at the Iraq Government forces, the whole policy of desert administration was reviewed, and the decision to establish the posts at Salman and Shabicha was taken. The Busaiya raid was carried out on the night of 5th/6th November, 1927, by forty men of the Mutair who, contrary to " Jundi's " statement, made no attempt to rob neighbouring tribes. It differed from all other raids in being a deliberate attack on the Iraq Government. No " similar raids followed in rapid succession," but raids took place on 9th December in the neutral area, on 17th December at Jumaima, which is on the frontier, and on 19th February, 1928, at

Jarishan on the Iraq–Koweit border. In addition there were two raids in Koweit territory, which was not at this time included in the A.O.C.'s responsibilities. There were no other raids in Iraq until 29th December, 1928, when a raiding party was encountered at Ath Thulaima, which is actually on the frontier, and driven back before it could do any damage. This was the last raiding party which attempted to enter Iraq. It is true that Iraqi tribes which had gone into Nejd were attacked in that country on a few occasions, but no forces, either ground or air, however strong, can protect people on the far side of a frontier which the forces are not allowed to cross. The permission to operate in Nejd was withdrawn in the Spring of 1928 and not renewed.

It was during this short period that operations were carried out to drive the Akhwan 70 miles from the frontier back into Nejd, and counter-raids were made by aircraft on the Jarishan raiders at As Safa (Lusafa), 150 miles within the frontier of Nejd. It was these counter measures, and the stir which they made in Nejd, which forced Ibn Saud to realize that he must control his tribes or fall out with the British Government. The result was that he asked for a meeting with a British representative at Jeddah, and at Buraida persuaded or ordered the dispersal of a concentration of all the principal Akhwan tribes, stated by him to Sir Gilbert Clayton to be 60,000 strong. It is incorrect to imply that the raids carried out by the Akhwan were the ordinary inter-tribal forays; in these the principal object is the lifting of camels and sheep, and human casualties are avoided as far as possible on account of the resulting blood-feuds. It is incorrect, moreover, to describe the Iraqi tribes as unarmed; all the tribes, badu or settled, have large numbers of arms. They have suffered very severely in the Akhwan raids because they cannot or will not concentrate to meet them, and because the fanatical Akhwan, careless of their own lives in what they believe to be the cause of the faith, are entirely ruthless in the slaughter of their enemies. Much of the success achieved by the Akhwan was due to the terror which they inspired, and to the impossibility of allowing the Iraqi tribes to retaliate by counter-raiding into Nejd.

Later the author records briefly the final defeat of Faisal-ad-Dawish, the Sheikh of the Mutair. The statement that "Dawish's depredations in Nejd, however, brought him into direct conflict with Ibn Saud" hardly does justice to the very obscure and intricate political situation in Northern Nejd during 1928–1929, to the part which Ibn Saud's embargo upon imports from Koweit into Nejd played in events, nor to the discontent and ambitions of Faisal-ad-Dawish himself.

From being the spearhead of the attempt to include the Iraqi desert tribes within the sphere of influence of the Sultanate of Nejd, the Dawish

had become a rebel against his master and even, rumour said, his rival. Month after month Ibn Saud, instead of punishing the raiders or taking action against the " rebels," blamed the British Government, first, for the refugee raids into Nejd and then for the policy of establishing the desert posts which, he said, had caused the defection of his followers.

Finally, the picture which " Jundi " gives of the Southern Desert of Iraq scarcely tallies with facts. The grazing areas, as any one with the least acquaintance with the desert knows, are not meadows of lush grass surrounding the wells. After the first good rains many wells and watering holes are filled, and grazing of one kind or another is found almost wherever rain has fallen. It is not confined to the well-areas, which—wells or pools—are required for watering flocks and herds that frequently trek 50–60 miles from their grazing ground for this purpose. As the hot weather advances the pools dry up, and there is an annual migration of the tribes towards the Euphrates. This occurs about June, and from that month until favourable reports of rain arrive, the tribes remain in the neighbourhood of the river. It is clearly absurd, therefore, to state that the establishment of three posts was designed to " deny the main water-bearing areas to the raiders." Such posts can deny only what is within the range of the rifles of the garrison. The main object was to protect a wireless station by which information could be transmitted to the aerodrome at least twenty-four hours quicker than by any other means. Even the protection of supplies of petrol and food was a later and minor use to which the posts were put. The success which was achieved by this means is admitted, although it is implied that it was the presence of immobile garrisons which was responsible for preventing the Akhwan from attempting raids deep into the Iraqi desert, and not the aircraft, armoured cars and, latterly, the small but efficient force of Police with cars and camels.

Neither the High Commissioner nor Air Officer Commanding expected to prevent all raids from crossing a frontier 450 miles long which, except for a short period, could not be crossed by the forces located in Iraq, or to protect completely the tribes which grazed up to or over this frontier. Even in the North-West Frontier Province of India, where some forty to fifty regular battalions with a due proportion of artillery and cavalry assisted by several irregular corps, as well as five squadrons of R.A.F., are available, the military authorities are unable entirely to prevent raids across an administrative border less by one-third than the desert frontier of Iraq South of the Rutbah-Ramadi route. The main objects of operations were, firstly, to put a stop to raiding from Iraq by bands of Shammar and other Nejdi refugees into Nejd (in which they were successful) and, secondly, to give such measures of protection

as would prevent the Iraqi tribes such as the Amarat, the Dahamshah, the Dhafir and the shepherds from throwing their lot in with the Akhwan. Some of the Dhafir actually went over to the Akhwan, and sections of the shepherd tribes, impelled by necessities of grazing, bought partial immunity by paying "zikat" to Ibn Saud's agents, but no wholesale defection occurred. If it had, the so-called Southern Desert would for practical purposes have become part of Nejd, and the authorities in Iraq would have been faced with the protection of the towns, villages and settled tribes along the long line of the Euphrates, as well as the route from Rutbah to Ramadi, used by the air mail to India and by the motor service from Damascus (which, it is hoped, will soon be traversed by a railway and pipe-line), without the power to meet their enemies far from these vulnerable localities. That the Air Force have not failed in this aim is clear from the situation in the Desert to-day.

CORRESPONDENCE

A PIONEER OF MILITARY AVIATION

To the Editor of the R.U.S.I. Journal.

Sir,—The death of Air Vice-Marshal Sir Sefton Brancker in the disaster to "R.101" last autumn recalls his work as a pioneer in aerial co-operation with the Army.

I have a copy of a report written on a piece of cardboard by Brancker, then a Captain serving in India, of a reconnaissance he carried out on 16th January, 1910, during manœuvres in the neighbourhood of Orangabad. This, I believe, was the first time an aeroplane was ever used with troops, at any rate, in India. Incidentally, it was also, to the best of my belief, the first occasion on which a cavalry division was ever concentrated for manœuvres in that country.

Brancker's plane was a most comical looking affair, and it never seemed to fly much higher than about 300 feet with the result that, as soon as it came anywhere near troops, everyone dived for cover, fearing that it was about to fall on their heads. On the occasion when Brancker sent this report, he notes that the duration of his flight was 35 minutes. The following day he crashed from 30 feet. It is typical of the man that in his pencilled report he says "no one hurt" whereas, in point of fact, he had cut his nose badly on a wire stay.

I am, Sir,

Yours, etc.,

A. Campbell Ross,

Bolarum. Brigadier.

THE VALUE OF DELAY

To the Editor of the R.U.S.I. Journal.

Sir,—In a discussion entitled "The Value of Time," which appeared under the name of "Phormio" in the Journal for November, 1930, the writer desired to raise to the status of a principle of war the axiom, "To make the best use of the time available is a factor of success in any enterprise."

Before accepting this dictum, would you allow me to point out that such an axiom, like most of its kind, expresses a delicate balance between two opposed ideas; but unfortunately one end of the see-saw rises so prominently into the air, and is so often pointed out by the platitudinarians, that the other, in the grass, is apt to be forgotten—to the detriment of prompt and dashing people who love to jump both feet together on to what they can see.

The opposed ideas balanced in the axiom are expressed in the proverbs "A stitch in time saves nine" and "More haste less speed" respectively. The danger of being too quick is less apparent than that of being too slow; yet the latter alternative may lead to disaster for the same reason as the former, namely, because the best use has not been made of all the time available.

Whether this time be short, as in the heat of battle, or whether it be long, as in the preparation for a campaign, it should be divided into three phases, each used for a different purpose. The first phase should be used to collect data on which to base a decision, the second to make the decision, the third to prepare for its execution. The art of making the best use of the time available involves a correct allotment of that time between these phases.

During training in peace time so much emphasis is placed on the need for rapidity in war that there is a tendency on the part of staffs to make decisions unnecessarily early and on inadequate data. Examples from the Great War include the rushed and unplanned despatch of the 29th Division to the Dardanelles, the bottling up of Basra harbour by the demand for reserve stores before the port had been adequately equipped to deal even with the daily consumption of the army to be landed, the premature and inaccurate estimate of the supplies in Kut, the misuse of those twin surprises, gas and tanks, and the formation of "Kitchener's army." It is true that the time saved by a quick decision may be used in improving its execution, and that a sound plan, well executed, is better than a brilliant plan, blemished. "The better is enemy of the good." But most decisions made on inadequate data will never reach the standard of "good," and the time thus apparently saved has to be spent later in amending and not in perfecting the original plan. The problem is not merely one of rapid decision, or even of the rapid collection of information. Besides these processes it is necessary to judge when the available information is sufficient, or the time when such a decision must be made even though the data are admittedly incomplete.

The difficulty is as old as the hills; it is common in civil life. It concerns the proper relations between the layman and the expert; the minister and the civil servant; the director and the works manager; the general and his staff; the principal staff officer and his directors. In any organization the individual should be an expert to his superior and a layman to his subordinates. Now experts never have enough time to be as expert as they would wish; they tend, therefore, to be sceptical over the accuracy of the information they possess, sanguine over that shortly to be obtained. Their plea is ever for another month, another week, or another day in which they may be able to achieve perfection. A layman, on the other hand, seldom has time to verify all his assumptions, and his data can rarely be adequate. He must, therefore, be trained to work without that certainty towards which the expert aims.

In these circumstances commanders and their staffs require judgment, experience and intuition if they are to decide and not just guess. They must have sharp eyes for assumptions disguised as facts. Finally it is only when the expert and the layman know enough about each other's work, and can appreciate each other's difficulties, that the former can allot to the latter the right amount of time for the collection of the data he is to use.

The second phase, the making of the decision, is one in which rapidity is sufficiently inculcated by peace-time training. But this very power of rapid decision sometimes tempts officers into the opposite fault—that of postponing a decision too long and leaving insufficient time for its proper execution. The official histories of the Great War are full of incidents where orders reached troops barely in time, or too late, for execution. Staffs do not appear to study sufficiently the channels of communication.[1] This vice is acquired in peace time, when those channels notoriously do not correspond to war conditions. Unfortunately, the energetic officer, anxious to avoid delay, will often prefer to short-circuit the normal system through the medium of the telephone or an interview, which really blocks it still further, instead of reforming his methods of conducting his daily routine. In peace time, inefficiency and lack of forethought can be cloaked by a liberal use of the word "Urgent," because the administrative and executive

[1] See also articles on "Communications and Command" by Captain F. S. Morgan in the JOURNAL for February and current number.—EDITOR.

branches have a reserve of time which can be filched from leave, exercise and military training. In war, no such reserve is available, consequently staff officers should learn, in peace, that special and express trains delay ordinary traffic. I suggest a weekly return by all staff officers to their commander showing how often they have used that word, why, and how they propose to prevent a repetition if similar circumstances recur.

To sum up: commanders and their staffs are not training themselves to make the best use of the time available merely by increasing the speed at which they perform their own functions. They must also be trained to apportion the time rightly between the phases of collection of data, decision and preparation. Finally the first decision to make in any situation is a decision as to the amount of delay permissible before action is essential.

I am, Sir,

Yours, etc.,

J. B. H. DOYLE,

Christchurch. Major, R.E.

GUERILLA TACTICS

TO THE EDITOR OF THE R.U.S.I. JOURNAL.

SIR,—May I be permitted to endorse very heartily the points made by Captain Foster in his plea for greater scope and latitude in the setting of schemes ?[1]

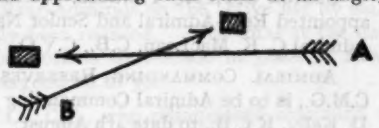
I call to mind many stirring days in India—and very likely Captain Foster does too—in which all ranks were utilizing their brains to the utmost and straining every nerve to get the better of the enemy. How stimulating they were ! How carefully they were discussed afterwards by all ranks ! What multitudes of lessons (both how to do it and how not to do it) were learned, though no pre-arranged "lesson" may have been ordained !

Like Captain Foster, I am not suggesting that stereotyped lessons should not be taught in a stereotyped way, but I am pleading for a little license, a little imagination, as well as for a greater opportunity for troops to utilize subtlety, ingenuity and even low down cunning—if they possess it—with which to outwit the enemy. Surely we could graft on to our present well-tried instructional methods an off-shoot of Boy Scoutism ? The methods of Baden-Powell stimulate qualities of "energy, cunning and originality."

Might I suggest two further schemes to add to Captain Foster's list ? I have found them produce interesting situations, and they at any rate have the merit of avoiding the presence of artificial boundaries :—

(*a*) A force has to seize and destroy a wireless station, weakly held—if at all. A relieving force is approaching and is timed to arrive simultaneously with the raiders.

(*b*) Two forces both advancing, and approaching each other at an angle, each with orders to occupy a position slightly beyond the point of intersection; thus:—



I am, Sir,

Yours, etc.,

Woolwich. A. H. BURNE,

Major, R.A.

[1] See JOURNAL for February, 1931, page 177.

NAVY NOTES

GREAT BRITAIN

Flag Appointments.

Portsmouth Dockyard.—Rear-Admiral H. K. Kitson, C.B., has been selected to succeed Vice-Admiral L. A. B. Donaldson, C.B., C.M.G., retired, as Admiral Superintendent of H.M. Dockyard, Portsmouth, to date 13th May, 1931.

Rear-Admiral, Second Battle Squadron.—Rear-Admiral W. F. French, C.M.G., has been appointed Rear-Admiral, Second Battle Squadron, Atlantic Fleet, in succession to Rear-Admiral C. J. C. Little, C.B., to date 25th April, 1931. His flag will be flown in H.M.S. "Warspite."

Coast of Scotland.—Rear-Admiral the Hon. W. S. Leveson-Gower, D.S.O., has been appointed Rear-Admiral and Commanding Officer, Coast of Scotland, in succession to Rear-Admiral T. J. Hallett, C.B., C.B.E., to date 6th July, 1931. His flag will be hoisted in H.M.S. "Greenwich" and transferred to the shore next day.

Malta Dockyard.—Rear-Admiral the Hon. Matthew R. Best, C.B., D.S.O., M.V.O., has been appointed Rear-Admiral in Charge, Malta, and Admiral-Superintendent, Malta Dockyard, in succession to Vice-Admiral F. H. Mitchell, C.B., D.S.O., to date 12th June, 1931.

The Portsmouth Command.—With reference to the appointment, announced in the last issue of the Journal, of Admiral Sir Arthur K. Waistell, K.C.B., to be Commander-in-Chief, Portsmouth, this will date from 9th June, 1931, instead of from 8th May, as previously notified.

The China Command.—Vice-Admiral Sir Howard Kelly, K.C.B., C.M.G., M.V.O., late Second-in-Command, Mediterranean Fleet, assumed command of the China Station on 28th February, 1931, in succession to Admiral Sir Arthur Waistell, and hoisted his flag in H.M.S. "Suffolk," which is serving as flagship during the absence from station of the "Kent."

The Africa Command.—Vice-Admiral Hugh J. Tweedie, C.B., late Senior Naval Officer, Yangtse, assumed command of the Africa Station on 26th February, 1931, in succession to Vice-Admiral R. M. Burmester, C.B., C.M.G.

Senior Officer, Yangtze.—Rear-Admiral Frank F. Rose, D.S.O., has been appointed Rear-Admiral and Senior Naval Officer, Yangtze, in succession to Rear-Admiral C. K. MacLean, C.B., C.V.O., D.S.O., to date 28th August, 1931.

Admiral Commanding Reserves.—Vice-Admiral Henry W. Parker, C.B., C.M.G., is to be Admiral Commanding Reserves, in succession to Admiral Sir John D. Kelly, K.C.B., to date 4th August.

League of Nations.—Vice-Admiral Frederic C. Dreyer, C.B., C.B.E., Deputy Chief of the Naval Staff, will act as the Admiralty representative on the League of Nations Permanent Advisory Commission, in addition to his present duties, as from 27th April, in succession to Admiral Sir D. Murray Anderson, K.C.B., C.M.G., M.V.O.

Command Terminated.

The ships of the Third Battle Squadron having been paid off to be scrapped or de-militarized under the terms of the London Naval Treaty, the command of that Squadron has been terminated.

Flag List Changes.

The first change on the Flag List in 1931 occurred on 17th February, when Rear-Admiral B. M. Money, D.S.O., was placed on the Retired List at his own request. Captain S. R. Bailey, C.B.E., D.S.O., A.D.C., was promoted to the rank of Rear-Admiral from the same date.

A series of promotions and retirements began from 1st April. On this date, Admiral Sir Herbert W. Richmond, K.C.B., was placed on the Retired List, at his own request; Vice-Admiral Sir Henry T. Buller, G.C.V.O., C.B., was promoted to Admiral; Rear-Admiral Herbert W. W. Hope, C.B., C.V.O., D.S.O., to Vice-Admiral, and placed on the Retired List, 2nd April; and Captain F. A. Sommerville, D.S.O., A.D.C., to Rear-Admiral, and placed on the Retired List, 2nd April. Captain Geoffrey Blake, C.B., D.S.O., A.D.C., and Captain R. C. Dalglish, A.D.C., both promoted to Rear-Admiral, to date 2nd April.

Rear-Admiral A. J. B. Stirling, C.B., was promoted to Vice-Admiral, 2nd April, and placed on the Retired List, 3rd April. He retains his post as Admiral-Superintendent of Chatham Dockyard. Rear-Admiral John M. Casement, C.B., was promoted to Vice-Admiral, 3rd April, and placed on the Retired List, 4th April. Captain A. R. W. Woods, D.S.O., A.D.C., was promoted to Rear-Admiral, 3rd April, and placed on the Retired List, 4th April.

Rear-Admiral A. J. Davies, C.B., was promoted to Vice-Admiral, 4th April. Captain A. L. Snagge, A.D.C., was promoted to Rear-Admiral, 4th April. Captain John D. Nares, D.S.O., A.D.C., was promoted to Rear-Admiral, 4th April, and placed on the Retired List, 5th April. Captain G. L. Massey, A.D.C., was promoted to Rear-Admiral, 5th April, and placed on the Retired List, 6th April. Captain B. G. Washington, C.M.G., D.S.O., A.D.C., was promoted to Rear-Admiral, 6th April, and placed on the Retired List, 7th April. Captain R. St. P. Parry, D.S.O., M.V.O., was promoted to Rear-Admiral, 7th April, and placed on the Retired List, 8th April. Captain F. M. Austin was promoted to Rear-Admiral, 8th April.

Rear-Admiral J. L. Pearson, C.M.G., was placed on the Retired List at his own request, to date 31st March. Rear-Admiral H. S. Monroe, D.S.O., was placed on the Retired List at his own request, to date 3rd April. No promotions to Flag rank were made in these vacancies. In his Memorandum dated 2nd March, 1931, the First Lord of the Admiralty said: "The Board have decided upon an eventual reduction in the number of Rear-Admirals on the active list by eight officers, of which number six have already been reduced." The total at the date this was written stood at 41. As no promotions were made in place of Rear-Admirals Pearson and Monroe, the list was reduced to 39.

Admiral Sir Henry T. Buller, G.C.V.O., C.B., who relinquished command of His Majesty's Yacht on 1st April, was placed on the Retired List, at his own request, to date 20th April, whereby Vice-Admiral Sir D. Murray Anderson, K.C.B., C.M.G., M.V.O., was promoted to Admiral, Rear-Admiral the Hon. A. B. S. Dutton, C.B., C.M.G., to Vice-Admiral and placed on the Retired List, 21st April, and Captain B. W. M. Fairbairn, O.B.E., A.D.C., to Rear-Admiral; Rear-Admiral W. M.

Kerr, C.B., C.B.E., was promoted to Vice-Admiral to date 21st April, but no Captain was advanced to Rear-Admiral on this date, so that the total of Rear-Admirals was further reduced to 38.

The following promotions on the Retired List were announced by the Admiralty on 1st April :—Rear-Admirals C. A. Fountaine, C.B., T. E. Wardle, C.B., D.S.O., A. F. Beal, C.B., C.M.G., B. St. G. Collard, C.B., D.S.O., C. T. Hardy, C.B.E., H. H. Smith, D.S.O., and O. E. Leggett, C.B., to be Vice-Admirals—to date 1st April; H. R. Godfrey, C.B., D.S.O., E. Wigram, C.M.G., D.S.O., and S. L. Willis, to be Vice-Admirals—to date 2nd April. Captain T. J. S. Lyne, C.B., D.S.O., to be Rear-Admiral—to date 3rd April.

The Navy Estimates.

The Navy Estimates for 1931–32 were issued on 5th March (No. 53, price 9s.), accompanied by the Statement of the First Lord of the Admiralty (Cmd. 3799, price 3d.). The net total was £51,605,000, which was £342,200 less than the net total of the 1930 Estimates, including the Supplementary Estimate of last July.

The First Lord in his Statement said that the gross total was £1,818,779 less than in 1930, because the appropriations-in-aid were £1,476,579 less; and this, after allowing £600,000 less for overhead or shadow cut than last year. Therefore, reductions of no less than £2,418,779 gross have had to be found in order to provide the net reduction of £342,200. A large part of the falling-off in appropriations-in-aid is due to such causes as the completion in 1930 of the instalments of the generous contribution made by the Federated Malay States towards the cost of the Singapore Naval Base; a heavy fall in the earning powers of the Admiralty oversea oilers owing to the depressed state of the freight market; and in part the completion of the refit of the Chilean battleship, "Almirante Latorre," and smaller anticipated payments by Dominion Governments for equipment and stores supplied.

The action of the Government in curtailing the 1928 and 1929 programmes continues to affect the provision required for new construction, which is less by £241,000 than it was in 1930. It is also less by £4,000,000 than it would have been if the programmes had been carried through as originally approved. The new programme of shipbuilding includes :—Two cruisers of the "Leander" class; one cruiser of about 5,000 tons; one leader and eight destroyers; four sloops; three submarines; one shallow draught gunboat; one mining tender for the "Vernon"; and one gate vessel for defence booms. This is the normal annual instalment of building under the London Naval Treaty.

Vote A (Numbers) for 1931 stands at 93,650, the total expected to be borne on the first day of the new financial year. This number is expected to fall, almost entirely by natural wastage, to 91,840 by 31st March, 1932. In the space of exactly four years the strength of the personnel of the Navy will actually have been reduced by 10,000 officers and men. As in former years, a series of "Notes on Matters of General Interest" were appended to the First Lord's Statement. (See "A Hundred Years of the Royal Navy," in this Journal, p. 255).

The Estimates were presented in Committee of Supply of the House of Commons by Mr. A. V. Alexander, M.P., First Lord, on 11th March. The First Lord took an opportunity to explain the results of the conversations which had recently taken place between France, Italy and Great Britain on the question of the limitation of naval armaments, and the agreement arrived at by himself and Mr. Henderson, Foreign Secretary, in consultation with foreign representatives

in Paris and Rome. An amendment was moved by Lieutenant-Commander Kenworthy that in the opinion of the House it is desirable for strategic and economic reasons and to help in providing employment that energetic steps be taken to encourage the use of oil fuel for the Royal Navy from our own coal. The Civil Lord of the Admiralty, Mr. Hall, announced that the Government were prepared to accept this amendment, being very largely in agreement with what it contained. The amendment was, by leave, withdrawn.

Supplementary Estimate.

A Supplementary Estimate for the Navy during the year ending 31st March, 1931, beyond the sum already provided for that year, was issued on 5th March, 1931, amounting to £495,000. Authority was sought for the utilization of surpluses on gross expenditure under certain Votes, amounting to £627,000, together with surplus receipts, amounting to £19,500, towards meeting anticipated excess expenditure under other Votes and deficits on appropriations-in-aid, amounting in the aggregate to £1,141,500, and for the grant of an additional sum of £495,000 to make good the anticipated net deficiency. The deficiency on gross expenditure was mainly due to payments to contractors arising out of the cancellation of orders for the construction of certain ships of the 1928 programme, for which a token sum only was taken in the original estimate; and to the overhead reduction that was made for contract work in Votes 8 and 9 (to discount in advance possible delays) having proved to be too large.

Personnel.

Retirement Scheme for Lieutenant-Commanders and Lieutenants.—Special terms of retirement, with a view to removing the substantial surplus which exists of Lieutenants and Lieutenant-Commanders on the executive lists, were announced in the Press on 2nd February and in Fleet Orders on 6th February. They apply to Lieutenants of seniority 1923 and to Lieutenant-Commanders of seniorities 1923 to 1931. They are open to officers ex-Mate and ex-R.N.R., as well as ex-Cadet, but not to officers on the Supplementary List or officers ex-Warrant rank. Retirement will be in batches spread over about two years, and the number of each seniority to be allowed to retire will be limited to roughly one-sixth of the total number of that seniority. The terms are retired pay as laid down in the non-service scale on page 44, section A2, Appendix to the Navy List, plus £90 standard per annum; that is to say, £165 a year, with an addition of £7 10s. a year for each of the first six complete years of service, and an addition of £12 10s. a year for each complete year of service subsequent thereto, in the ranks of Lieutenant and Lieutenant-Commander. The first batch was to be about 70 in number, and applications were to reach the Admiralty by 1st April. The dates and numbers of subsequent batches will be notified by Admiralty Fleet Order in due course.

On 7th April, the Admiralty announced the names of thirty-nine Lieutenant-Commanders and five Lieutenants who had been "placed on the Retired List at their own request under Admiralty Fleet Order 289/31," with effect from various dates.

Officers' Prospects.—As the retirement scheme appears to have caused some parents to ask themselves whether a boy who becomes an officer in the Royal Navy in present circumstances can look forward to this as his life's career, the Admiralty, on 18th March last, issued a statement of the position. An endeavour is made so to regulate entries that Cadets may have a reasonable prospect of a

career. Pre-War and War expansion, and post-War retrenchment, were reviewed, and it was shown that "there still remains a number of officers in excess." As a result of the London Conference, the Admiralty are able to look ahead and have, therefore, offered special terms of retirement to about 150 of these surplus officers. "It is desired to emphasize," said the notice, "that the only officers affected by the retirement scheme are those entered during the War and in the years immediately preceding it. When this reduction has been carried out, it is considered that, with the fleet at its present strength, further retirement schemes will not be necessary." As regards Engineer, Accountant and Royal Marine officers, no special retirement scheme is required, and it is anticipated that they will continue as hitherto to enjoy satisfactory promotion prospects.

Officers' Pay Reduced.—From 1st July, 1931, the reduction from standard rates of officers' pay, retired pay, etc., will be 8 per cent., instead of 7 per cent., and this rate will be in force until 30th June, 1933. Under the approved formula, a reduction of 8 per cent., instead of the former 6 per cent., should have operated from 1st July, 1930, but the Government decided that the reduction for the twelve months from that date to 30th June, 1931, should be limited to 7 per cent. In view of the continued fall in the cost of living index figures, it has been decided that this modification of the formula can no longer be continued.

Naval History Prizes.—The following officers have been awarded prizes as shown on the result of the annual examination in naval history for the year 1930:—Lieutenant R. W. Griffith, R.N., H.M.S. "Vernon," prize of £30; Lieutenant P. Bethell, R.N., H.M.S. "Glorious," prize of £20; Lieutenants H. G. D. de Chair, R.N., H.M.S. "Nelson," and A. C. Stanford, R.N., H.M.S. "Stuart," prizes of £10 and certificates of merit.

Prize for Naval Cadets.—The mother of the late Lieutenant E. W. Howard-Crockett, R.N., has offered a sum of money to provide a prize to perpetuate the memory of her son. The Admiralty have accepted the offer on behalf of the Naval Service, and after consultation with the donor have decided that eight awards, each consisting of books and/or instruments to the value of £2, are to be made each year to Naval Cadets passing out of Dartmouth and H.M.S. "Erebus" for qualities of leadership and good example. The award will be known as the "Eardley Howard-Crockett Prize."

Ryder Prize, 1930.—The Ryder Memorial Prize for 1930 has been awarded to Acting Sub-Lieutenant R. G. Norfolk, R.N., who passed the best examination in French in the Sub-Lieutenants' educational courses held at the R.N. College, Greenwich, during 1930.

Language Examinations.—On the results of the annual examination in foreign languages held in December last, Lieutenant (E) H. F. Atkins, H.M.S. "Queen Elizabeth," has been awarded a certificate of merit for Spanish; Lieutenant A. T. Courtney, P. and R.T. School, a prize of £10 and certificate of merit for Russian; and Lieutenant C. H. Holmes, H.M.S. "Malaya," a prize of £10 for Japanese (he was awarded a certificate of merit in previous examination).

Goodenough Prize, 1930.—The Goodenough Memorial Prize for the year 1930 has been awarded to Sub-Lieutenant R. J. Robertson, R.N., of H.M.S. Dryad."

Jackson-Everett Prize, 1930.—The Jackson-Everett Prize for 1930 has been awarded to Lieutenant J. Liddell, R.N., of H.M. Signal School, Portsmouth.

GEDGE MEDAL AND PRIZE, 1930.—The Gedge Medal and Prize for 1930 has been awarded to Paymaster Sub-Lieutenant J. G. Bennett, R.N., of H.M.S. "Dunedin."

THE LECTURE LIBRARY.—It has been decided that in future the Lantern Lecture Establishment, Royal Naval College, Greenwich, is to be known as The Lecture Library.

MARRIAGE ALLOWANCE REDUCED.—On 27th February, the Admiralty notified that marriage allowance for ratings—such an allowance is not payable to officers—would be payable during the financial year beginning on 1st April, 1931, at the rates shown in the column headed "minimum scale 50" in the relevant appendix to King's Regulations, instead of at the rates shown on the minimum scale of 70. The rate for a wife only remained unchanged at 7s. weekly, but rates for wives and children, according to the number of the latter, were reduced from 1s. to 3s. weekly.

SEA TRAINING OF BOYS.—A Fleet Order dated 6th February notified that as a result of the London Naval Treaty, the ships of this Squadron would cease to be available to form a Boys' Training Squadron. The drafting of boys to the Squadron ceased on 1st January, 1931. In future all boys joining ships will come direct from the shore training establishments, and will have had no experience of conditions in a seagoing ship. Their practical knowledge of seamanship, therefore, will be limited. Certain steps for additional instructors in seagoing ships, to help give the boys a proper grounding in seamanship, were outlined.

RECRUITING DEPARTMENT ADDRESS.—The address of the Department of Naval Recruiting, and of the Headquarters, London Recruiting Office, will in future be No. 85, Whitehall, S.W.1. This change is in consequence of the renumbering of Whitehall, and not through removal to fresh premises.

R.N. BENEVOLENT TRUST.—Their Lordships have appointed Vice-Admiral the Hon. Sir Herbert Meade, K.C.V.O., C.B., D.S.O., to be President of the Royal Naval Benevolent Trust in succession to Vice-Admiral Sir Henry T. Buller, G.C.V.O., C.B., A.D.C., late Vice-Admiral Commanding H.M. Yacht, as from 1st April, 1931.

NAVY WEEKS, 1930.—An audited statement of the Navy Week's Charities Fund Account for 1930 was published in Fleet Orders on 27th February. The grand total disdursed between hospitals and institutions was £3,540.

MATERIAL.

SHIPS COMPLETED AND COMPLETING.—The cruiser "Exeter," the only ship of her class in the 1927 Navy Estimates, is due for completion at Devonport on 23rd July. She is to relieve the "Hawkins" in the Second Cruiser Squadron, Atlantic Fleet. The latter ship has already been withdrawn, and the flag of the Rear-Admiral Commanding will fly in the "Dorsetshire."

The flotilla leader "Keith" and destroyers of the "Beagle" class (1928 programme) have been completed during the past quarter and will replace the "Broke" and "W" class destroyers in the Fourth Flotilla, Mediterranean. The "Broke" is to relieve the "Keppel" as seagoing tender to the R.N. Engineering College, Keyham. The "Keppel" and "W" destroyers from the Fourth Flotilla, after refit, will proceed to China in the winter of 1931 to replace the flotilla of "S" class vessels which are due for scrapping in 1932.

Of the four submarines of the "Rainbow" class (1928 programme), the "Regent," "Regulus" and "Rover" have been completed, and were ordered to proceed to the Mediterranean to join the First Flotilla. The "Rainbow" is due to be completed at Chatham Dockyard by the end of November.

LAUNCH OF THE "BIDEFORD."—The sloop "Bideford" (1929 programme) was launched at Devonport on 1st April. This was the third of the four sloops of this programme, the "Fowey" and "Shoreham" having already been launched.

CONSTRUCTION IN 1931–32.—During the financial year ending on 31st March, 1932, nine vessels will be completed for the Royal Navy, as compared with thirty in 1930–31 and twenty-two in 1929–30. The nine are the cruiser "Exeter," the destroyers "Beagle" and "Acheron," the submarine "Rainbow," and the sloops "Fowey," "Shoreham," "Bideford" and "Rochester."

Work will be advanced during the year on the following twenty-nine vessels :—cruisers "Leander," "Neptune," "Orion" and "Achilles"—the first three in the dockyards, and the last-named by Cammell Laird & Co., Birkenhead; flotilla leaders "Kempenfelt" and "Duncan"; destroyers, twelve—four of the "Crusader" class and eight of the "Defender" class; submarines, six—four of the "Swordfish" class, at Chatham, and the "Thames" and "Porpoise," by contract; the sloops "Dundee," "Falmouth," "Milford" and "Weston-super-Mare"; and the "Guardian," netlayer, at Chatham.

ORGANIZATION AND DISTRIBUTION.

BATTLE CRUISER SQUADRON.—H.M.S. "Hood" commissioned for trials at Portsmouth on 10th March, 1931, after large repairs, and was ordered to complete with a full Portsmouth crew on 12th May for service as flagship of the Battle Cruiser Squadron, in succession to the "Renown."

H.M.S. "TIGER."—On the return of the "Tiger" to Devonport on 31st March, she was withdrawn from the Squadron, and arrangements were made to de-store and pay off the vessel, sufficient stores being left on board for the voyage to Rosyth for removal of turrets.

THIRD BATTLE SQUADRON.—H.M.S. "Marlborough," the last of the Third Battle Squadron, arrived at Devonport on 8th April from Portland to de-store and pay off, preparatory to being scrapped under the terms of the London Naval Treaty.

AFRICA STATION.—H.M.S. "Cardiff," after large repairs, commissioned on 1st April to relieve the "Calcutta" as flagship on the Africa Station. The latter left Simonstown on 20th March for St. Helena, Sierra Leone, and Chatham, where she was ordered to be commissioned in reserve until required for large repair. The flag of the Commander-in-Chief was transferred to the "Carlisle" on 20th March.

EXERCISES AND CRUISES.

COMBINED FLEET EXERCISE.—On the return of that portion of the Atlantic Fleet which had been on a cruise to the West Indies, a combined strategical exercise with the Mediterranean Fleet took place in the Atlantic Ocean between March 14th and 18th. On its conclusion, the two fleets remained together at Gibraltar until 26th March, to discuss matters of training, policy, and co-operation, after which the Atlantic Fleet returned to its home ports and the Mediterranean Fleet continued its Spring cruise.

MEDITERRANEAN VISITS.—The Commander-in-Chief in the Mediterranean, Admiral Sir Ernle Chatfield, paid a visit to the Commander-in-Chief of the Italian Fleet at Spezia from 8th to 10th April; and to the Commander-in-Chief of the French Fleet at Toulon, from 25th to 28th April.

WEST INDIAN VISITS.—The visits of Atlantic Fleet ships to the West Indies, the first for many years, was much appreciated at Trinidad, Jamaica, Barbados and the other places concerned. *The Times* Correspondent at Trinidad, writing on 2nd February, said: "The visits of foreign aeroplanes and warships in recent years had impressed the popular imagination, and the arrival of H.M.S. "Nelson" and H.M.S. "Rodney" is now very welcome. Although the need for economy is appreciated, it is strongly felt that more regular visits by the fleet to these Colonies are necessary in the interests of British prestige."

H.M.S. "NELSON" IN THE PANAMA CANAL.—From 23rd to 28th February, the "Nelson," flying the flag of Admiral Sir Michael Hodges, visited the United States Fleet at Balboa, berthing next to the "Texas" alongside the dock. The passage of the battleship through the Panama Canal attracted much interest. As the Canal locks are 110 feet wide, and the beam of the "Nelson" is 106 feet, there were only two feet to spare on either side. On arriving at Balboa the "Nelson" fired a salute of twenty-one guns and dressed ship in honour of Washington's birthday. An extensive programme of entertainment was arranged in honour of the visit.

H.R.H. THE PRINCE OF WALES AT BUENOS AIRES.—During the visit of the Prince of Wales to Buenos Aires in connection with the opening of the British Industries Exhibition on 14th March, a squadron consisting of the cruisers "Despatch," flying the flag of Vice-Admiral Vernon H. S. Haggard, C.B., C.M.G., and "Danae," the aircraft carrier "Eagle," and the destroyer "Achates" assembled in the harbour. The "Eagle" and her attendant destroyer had been sent out specially, the former carrying various types of British aircraft, which, on arrival, were temporarily housed at the El Palomar military aerodrome.

During a visit to the aircraft carrier on 15th March, the Prince of Wales conferred the insignia of C.B.E. on Captain Marcos Zar, Director of Naval Aviation in Argentina. President Uriburu and the Minister of Marine also visited the ship and inspected 1,600 men of the British squadron on the flying deck. On 20th March a display of aerobatics was given by pilots from the "Eagle" at Palomar in the presence of the Minister of the Interior and Argentine officers of all arms and foreign Air Attachés. Other displays were given by the officers of the flights in the "Eagle" during her stay.

NEW ZEALAND EARTHQUAKE.—On 2nd February an earthquake occurred in the district of Hawkes Bay, North Island, New Zealand, as a result of which the towns of Napier and Hastings were in great part destroyed. H.M. sloop "Veronica," Commander H. L. Morgan, D.S.O., was at Napier at the time of the first shock, and Commodore Geoffrey Blake, C.B., D.S.O., Commanding the New Zealand Division, in the "Dunedin," with the "Diomede" in company, proceeded there immediately from Auckland, with doctors, nurses, and medical and other stores. As telegraphic communication had been destroyed by the convulsion, the wireless telegraph apparatus of the ships was of great assistance.

COLLISION OF H.M.S. "GLORIOUS."

The aircraft carrier "Glorious," Captain C. E. Kennedy-Purvis, was in collision on 1st April during fog with the French liner "Florida," about 60 miles

East of Gibraltar and 30 miles S.E. of Malaga. The "Florida," homeward bound from Buenos Aires for Marseilles with 550 passengers and a crew of 170, was badly holed at a point where the steerage and third-class passengers were accommodated. About 24 were killed, some being crushed by cargo which was piled on them as a result of the impact.

The "Florida" was taken in tow stern first by the destroyers "Wryneck" and "Verity," and arrived at Malaga very much down by the bows; The "Glorious" was also damaged, but not so extensively, and arrived at Gibraltar on the morning of 3rd April. She had one seaman killed, and another injured. Some of her aircraft were up at the time of the collision, and were warned not to return to the ship. Most of them landed at Malaga, but four were lost; there were no casualties amongst their personnel.

A Commission of Inquiry was appointed composed of British, French, and Italian representatives, a Spanish naval officer, and representatives of the owners of the "Florida." A Naval Court of Inquiry was also held at Gibraltar.

Miscellaneous.

The Late Admiralty Librarian.—In his speech on the Navy Estimates on 11th March, the First Lord of the Admiralty referred to "the great loss we have suffered in the premature death of the late Librarian, Mr. W. G. Perrin."

Mr. W. G. Perrin, O.B.E., Admiralty Librarian, died on 10th February, after a short illness. He had been at the Admiralty since 2nd August, 1893, and had held office as Librarian since 10th April, 1908. The re-organization of the Library in its present quarters in the Admiralty Arch over the Mall was chiefly due to him, and he had done a vast amount of valuable work on naval history and research. His services to the Navy Records Society, the Society for Nautical Research and the new National Maritime Museum will be well known to many of our Members. Mr. J. Falkner Phillips, M.B.E., Deputy Librarian, has been appointed to fill the vacancy, and Mr. D. Bonner Smith has been appointed Deputy Librarian in succession to Mr. Phillips.

Navy Records Society.—Mr. W. C. Brian Tunstall, Lecturer in History and English at the R.N. College, Greenwich, has been elected to succeed the late Mr. Perrin as Hon. Secretary of the Navy Records Society.

Chaplain's Scarf.—It has been decided with the King's approval that in the conduct of religious services a Chaplain may, if he please, wear a black silk scarf embroidered at each end with an anchor attached by its cable to a cross and surmounted by a Royal Crown. Decorations and medals may be worn on the left side of the scarf when officers wear full dress or frock coat with epaulettes dress, and ribbons of decorations and medals when officers wear frock coat dress or undress.

Navy Week, 1931.

The annual Navy Week at Portsmouth, Devonport and Chatham will be held this year from Saturday, 1st, to Saturday, 8th August, both dates inclusive, but excepting Sunday, 2nd August, with the object of giving the public an opportunity to see the ships of the Navy and of raising funds in aid of naval charities. The charge for admission to the dockyards will be 1s., and for children under 14 half price.

THE FLEET AIR ARM

USE OF CATAPULTS.—The battle-cruiser "Hood" is the latest ship to be equipped with a catapult for launching aircraft. Ten other vessels are to be so equipped during the current financial year. Ships recently fitted include the battleship "Valiant," the cruisers "Cornwall" and "York," and submarine "M.2."

CARSLAKE ESSAY, 1932.—The subject of the essay for the award in 1932 of the Henry Leigh Carslake Prize for naval observers is as follows:—"The advantages and disadvantages of small aircraft carriers (10,000 tons or less) as compared with large (20,000 tons or over), both from the point of view of the British Empire and of other Powers." Essays must reach the Admiralty by 1st February, 1932.

H. L. CARSLAKE PRIZE.—The Henry Leigh Carslake Prize for 1931 has been awarded to Lieutenant-Commander R. M. Ellis, R.N., of H.M.S. "Courageous." This prize is awarded to the naval observer submitting the best essay dealing with the work of the Fleet Air Arm.

ROYAL MARINES

GENERAL LIST CHANGES.—Lieutenant-General Percy Molloy was placed on the retired list at his own request on 1st April. Major-General R. V. T. Ford, C.B., C.B.E., Adjutant-General, R.M., was promoted to be Lieutenant-General; Colonel Commandant (temporary Brigadier) George Carpenter, O.B.E., D.S.C., to be Major-General; Colonel Second Commandant R. D. Ormsby, C.B.E., to be Colonel Commandant, Plymouth Division; Lieutenant-Colonel and Brevet-Colonel W. W. Godfrey, C.M.G., Assistant Adjutant-General, to be Colonel Second Commandant, with seniority as Colonel 31st May, 1921; Lieutenant-Colonel J. W. Hudleston to be Colonel Second Commandant, Plymouth, with seniority as Colonel January 1st, 1922; and Major A. C. Barnby, O.B.E., Chatham Division, to be Lieutenant-Colonel.

OFFICERS' RELATIVE RANK.—Their Lordships have had under consideration the representations that have been received from the fleet from time to time to the effect that disadvantage has been found to follow from the abrogation, under Articles 224 and 745, King's Regulations and Admiralty Instructions, of the special relative rank previously accorded to Royal Marine officers when embarked, in view of the later ages at which their promotion is obtained as compared with officers of other branches, and the nature of the duties allotted to them when serving afloat.

Their Lordships, therefore, notified in Fleet Order 861, dated 10th April, 1931, their decision to re-enact the arrangements in force on this subject prior to the Regulations above mentioned, so far as this can be done without infringing the general table of relative rank of officers of the Royal Navy, Army and Royal Air Force. A table attached to the new order shows that a Lieutenant-Colonel or a Major R.M. will rank with a Commander; a Captain or Lieutenant R.M., on completing twelve years from date of entry, with a Lieutenant-Commander; a Captain R.M., under twelve years, or a Lieutenant R.M. on completing four years, with a Lieutenant R.N.; and a Lieutenant R.M. under four years from date of entry with a Sub-Lieutenant R.N.

DOMINION NAVIES.

ROYAL AUSTRALIAN NAVY

FURTHER RETRENCHMENT.—It was notified at Sydney in March that at the termination of his tenure in command of the Australian Squadron, Rear-Admiral E. R. G. R. Evans, C.B., D.S.O., would not be succeeded by another officer of flag rank. Captain L. Stanley Holbrook, M.V.O., commanding the cruiser "Canberra," would assume command of the Squadron from 27th May.

SUMMER CRUISE.—The "Australia" and "Canberra," cruisers, "Albatross," aircraft carrier, and "Anzac," flotilla leader, took part in the summer cruise of the Australian Squadron. Most of the time was spent in the neighbourhood of Hobart and other Tasmanian anchorages. On 8th April the cruisers and the "Anzac" arrived at Jervis Bay, on their way to Sydney.

ROYAL CANADIAN NAVY

DESTROYER CRUISE.—The destroyer "Champlain" left Halifax on 5th January for the customary cruise to Bermuda to join up with vessels of the Royal Navy. After a fortnight there, the vessel visited St. Kitts and Martinique, and on 9th February arrived at St. Lucia, where she met the cruisers "Dorsetshire" and "Norfolk" from home. A week later she went to Barbados and there met the "Hawkins," "York," "Adventure" and "Scarborough." Subsequently the "Champlain" visited Trinidad, Kingston, Jamaica, Turk's Island, and other places, returning to Bermuda on 6th Aprll. She arrived back at Halifax on 22nd April.

NEW ZEALAND DIVISION OF THE ROYAL NAVY

REFIT OF THE "DUNEDIN."—Captain M. J. C. de Meric, M.V.O., formerly in the "Diomede," exchanged into the "Dunedin" on 25th February, when the broad pennant of Commodore Geoffrey Blake was moved from the "Dunedin" to the "Diomede." The "Dunedin" left Russell on 28th February for Sydney and England, to refit. She was due at the Nore on 8th May. A sum of £135,091 is allocated to be spent on her in the current Navy Estimates.

FOREIGN NAVIES

BRAZIL

NEW FLYING BOATS.—The eleven Savoia flying boats which flew from Italy to Rio de Janeiro early this year have been purchased by the Ministry of Marine for about £9,200 each. The Italian airmen who piloted them have returned home.

CHILE

"ALMIRANTE LATORRE" COMPLETED.—The battleship "Almirante Latorre" left Plymouth on 5th March for Chile, on the completion of her reconstruction. On 17th February, to mark her association with the port, the vessel was presented by the citizens of Plymouth with two pieces of plate. Captain Campos, commanding the vessel, accepted the gifts from the Mayor of Plymouth, and expressed his best wishes for the future of the British Navy. About 2,000 men, on an average, were employed for eighteen months on the work done on board the "Almirante Latorre."

BRITISH NAVAL MISSION.—It was announced in the *London Gazette* on 24th February, that the King had granted Royal licence and authority to the following to wear the foreign decorations named, that had been conferred upon them :—Commander Frank Henderson Pegram, R.N., Commander Henry Neville Lake, D.S.O., D.S.C., R.N., and Engineer Commander Cecil Roderick Hoare, R.N., the Insignia of Commander of the Order " Al Merito," conferred by the President of the Republic of Chile. These officers have served as members of the British Naval Mission at Valparaiso.

FRANCE

NEW APPOINTMENT.—Admiral Durant-Viel, Commander-in-Chief of the Mediterranean Fleet, has been selected to succeed Admiral Violette as Chief of the General Staff at the Ministry of Marine, who has been placed on the retired list.

NEW CONSTRUCTION.—No new 10,000 ton cruisers nor flotilla leaders are projected, but two cruisers of 7,500 tons are to be laid down.

An order has been placed at Lorient for a new 3,000 ton net-layer.

" JULES VERNE " LAUNCHED.—On 3rd February, at Lorient, there was launched the submarine-depot ship " Jules Verne." The grandson of the romantic novelist, M. Jean Jules Verne, was present. The new vessel, authorised in 1926, is of 5,839 tons, and has accommodation for about 500 officers and men, including submarine crews. She will be propelled by Diesel engines of similar design to those in submarines, the maximum speed being 16 knots.

NEW DESTROYERS.—The destroyer leader " Aigle " was launched at Dunkirk on 19th February. She is the first of the third group, each consisting of six vessels, of the flotilla leader class, begun in 1922, 1926 and 1928 respectively. The first two were designed for speeds of 35½ and 36 knots, but the " Aigle " class are to do 37 knots. The displacement is 2,441 tons, and the armament five 5.5-in. guns, one 3-in. gun, four smaller anti-aircraft guns, and six torpedo tubes.

PROJECTED BATTLE-CRUISER.—M. Dumont, Minister of Marine, when presiding at a recent launching ceremony, said that in view of the appearance of a new type of armoured cruiser in the German Navy the French authorities should no longer confine themselves to the building of light vessels. The programme of new construction which he would shortly lay before the Chamber would therefore include provision for a battle-cruiser, which would be built in accordance with the terms of the Washington Treaty.

It seems to have been the original intention that this ship should not exceed 23,000 tons and that the armament would consist of 12-in. guns ; but a difficulty has arisen owing to the United States being unwilling to agree to limit any new battleships which may be constructed after 1936 to this displacement.

GERMANY

BUDGET AND BATTLESHIP BUILDING.—On 11th March, the Budget Committee of the Reichstag passed the Navy Estimates, included in which there was the first provision for the second of the 10,000-ton so-called " pocket battleships." This vessel is referred to as armoured vessel "B", or " Ersatz-Lothringen."

General Groener, Minister of Defence, speaking on the Budget, alluded to the strategical importance of the Baltic and the task of defending East Prussia.

The six-year building programme provides for the completion of the "Ersatz-Preussen," due to be launched on 19th May, 1931, and two similar ships, due to be laid down in 1931 and 1932 respectively; and for the laying down of the fourth ship in 1934. Each ship is to take about four years to build.

NEW CONSTRUCTION.—The fifth 6,000-ton light cruiser "Leipzig," building at Wilhelmshaven, will be completed during the current year.

The gunnery training-ship "Ersatz-Drache" is also to be completed during 1931, and a second ship the "Ersatz-Hay," is to be laid down at Kiel in 1936. The gunnery training-ship "Bremse," now completing at Wilhelmshaven, is a vessel of 1,250 tons with engines of 25,000 h.p. and a speed of 27 knots. Her armament will be varied as circumstances necessitate.

SALE OF OLD SHIPS.—According to the *Marine Rundschau* a number of old ships of the German Navy are to be sold. The list includes the battleships "Lothringen," "Braunschweig" and "Elsass"; cruisers "Amazone," "Nymphe" and "Hamburg"; the survey ships "Panther" and "No. 1"; the torpedo-boats "S.18," "S.19," "T.152"; and a number of patrol boats.

GREECE

NEW BRITISH SEAPLANES.—The final trials took place at Hamble on 11th March, of five of the twelve Fairey III F float seaplanes, built for the Greek Navy by the Fairey Aviation Company. The tests were watched by Captain Phocas, Naval Attaché to the Greek Legation, and Lieutenant-Commander Averoff, who has been in England for some time studying their construction and handling. The machines are all-metal and are similar in design to those in use in the Fleet Air Arm.

ITALY

NEW CRUISER.—The 10,000-ton cruiser "Pola" has been laid down at Leghorn.

NEW DESTROYERS.—The flotilla-leader "Alvise-Cadamosto" is reported to have attained a maximum speed of 43 knots and a mean speed of 41 knots on her trials.

The destroyers "Baleno" and "Strale" were launched at the end of March.

NEW SUBMARINES.—The submarine "Ruggero-Settimo" has been launched at Tarento; and the "Luigi-Settambrini" has successfully completed her trials off that port. Four other craft of the same class belonging to the 1930 Programme have been laid down at the local yard.

SAILING TRAINING SHIP.—The new training ship, "Amerigo-Vespucci" is due for completion this May. She is a sailing vessel of 4,000 tons, but has Diesel engines of 2,000 h.p.

JAPAN

LAUNCH OF THE "CHOKAI."—The cruiser "Chokai" was launched on Easter Sunday, 5th April, at the works of the Mitsu Bishi Company, Nagasaki, which are also providing her machinery' This is the last of the twelve 8-in. gun cruisers allowed to Japan under the London Naval Treaty. Her next cruisers are expected to be of about 8,500 tons, but their armament will be limited to 6-in. guns.

Eight of the 8-in. gun cruisers are in commission four of 10,000 tons and four of 7,100 tons; the remaining four are completing.

LAUNCH OF THE "RYUJO."—The aircraft carrier "Ryujo" was launched at Yokohama on 2nd April. She is much smaller than the "Kaga" and "Akagi," and has a displacement of 7,600 tons, geared turbine engines of 40,000 horse power, a speed of 25 knots, and an armament of twelve 5.1-in. guns.

PERSIA

The two gunboats building for Persia at Palermo will be vessels of 950 metric tons with a length of 204 feet and a draught of 10 feet. The first is due to be completed in October and the second in December next.

PORTUGAL

Orders have been given to Messrs. Yarrow for four destroyers of 1,400 tons, two of which are to be constructed in Lisbon, and also to Italian Yards for an aircraft carrier of 6,100 tons, which will carry fifteen aeroplanes, two submarines and two despatch boats of 2,000 tons. Two despatch boats of 1,000 tons have been ordered from Messrs. Vickers, and two armed sloops from Hawthorn Leslie and Co.

SOVIET UNION

BLACK SEA NAVAL AGREEMENT.—On 9th March, a protocol was signed at Angora between the Soviet Ambassador, M. Suritch, and the Turkish Foreign Minister, Tewfik Rushdi Bey, relating to the naval strength of the two powers in the Black Sea, and adjacent waters. The agreement stipulates that neither country shall start the construction of or procure any kind of warship destined to reinforce their respective fleets in the Black Sea or adjacent waters without informing each other six months in advance. The protocol is the sequel to the Soviet-Turkish Treaty of 1925, and additional to the protocol of December, 1929.

BRITISH SUBMARINE RECOVERED.—According to a report in the *Revista Maritima*, the British submarine "L.55" which was sunk off Kronstadt in 1919, and which was raised by Soviet Russia in 1924, is being reconditioned and is due for completion on 1st May.

SPAIN

NEW CONSTRUCTION.—The first of eight destroyers of the "Churruca" type was laid down at Cartagena on the 29th January.

TURKEY

NEW CONSTRUCTION.—The destroyer "Kocatepe," building at Ansaldo, and her sister ship, the "Adatepe," building at Genoa, have both been launched and are due for completion very shortly. They are vessels of 1,230 tons, and have engines of 40,000 h.p., giving a speed of 38 knots. Their armament consists of four 4.7 in., three 2-pdr. A.A. guns and six 21-in. torpedo tubes.

The submarine "Sakarya" was launched at Trieste in February.

NAVAL ATTACHE.—A Turkish Naval Attaché has been appointed to Rome.

UNITED STATES

BATTLE FORCE ORGANISATION.—Upon the withdrawal for modernisation of the "Mississippi" and "New Mexico," the following temporary organization of vessels of the Battle Fleet became effective as from 1st April:—

Battleship Division I (Rear-Admiral Luke McNamee): "Maryland," "Idaho," "California."

Battleship Division II: "Mississippi" and "New Mexico," both undergoing modernisation.

Battleship Division III (Rear-Admiral J. R. P. Pringle): "New York," "Oklahoma," "Nevada," "Pennsylvania," "Arizona."

Battleship Division IV (Vice-Admiral R. H. Leigh): "West Virginia," "Tennessee," "Colorado."

The inclusion of the "California" in the First Division is for tactical purposes; she retains her duty as flagship of Admiral F. H. Schofield, Commander-in-Chief of the Battle Fleet.

NEW CRUISER BEGUN.—Rear-Admiral L. R. de Steiguer, Commandant of the Brooklyn Navy Yard, on 14th March drove the first rivet in the keel of the cruiser "New Orleans," one of the seven 10,000-ton cruisers begun for the United States Navy during the past year. The vessels are to be 588 feet long and 61 ft. 9 in. in breadth. The designed speed is 32½ knots. They will be equipped with nine 8-in., eight 5-in., and eight A.A. guns, six torpedo tubes and four aircraft.

FLYING BOAT FOR SUBMARINES.—A new type of flying-boat, which it is claimed can be assembled and dismantled in three minutes has been adopted for use in United States submarines. It is a single-seater, 100 horse-power monoplane, and can be packed into an 8 ft. tube in the submarine. Although intended primarily for scouting, this flying-boat will carry sufficient armament to be effective against unarmoured aircraft. The hull is high, built entirely of metal, and is believed to be strong enough to ride choppy seas. It is expected that this auxiliary will greatly enhance the offensive and defensive power of submarine patrols.

THE NEED FOR BATTLESHIPS.—On his return from the U.S. Fleet Exercises off Panama, Admiral William V. Pratt, Chief of the Bureau of Operations, in an interview, is reported to have declared that aviation cannot sink the battleship. "Bomb the biggest vessel from the air, and, when the smoke clears away, the ship will be fighting through. You cannot make a light-weight fighter take the place of the heavy-weight, either in the ring or on the sea. Unless supported by surface strength, no air force, however powerful, can halt the slow and steady advance of heavy ships."

NAVAL WAR COLLEGE.—A Bill has been put forward to provide an additional wing for the Naval War College. Except for a new library the College has not been enlarged since it was built in 1894 to accommodate five officers on the staff and eighteen students. The staff has been increased to twenty-two, and the students to eighty-two.

YUGO-SLAVIA

An order for a flotilla-leader has been placed with Messrs. Yarrow. The vessel will displace 2,400 tons, and have engines of 42,000 h.p. The armament will consist of four 5.5 guns and two triple torpedo tubes.

ARMY NOTES

HOME

EXTRACTS FROM THE MEMORANDUM OF THE SECRETARY OF STATE FOR WAR RELATING TO THE ARMY ESTIMATES FOR 1931.—The Army Estimates for 1931 have been fixed at a net total of £39,930,000, or £570,000 less than the amount voted in 1930. Of this total no less than £8,750,000 are hypothecated for non-effective services, so that the field within which economies can be sought is limited to some £31,000,000; in view of the progressive reduction of effective charges by nearly £5,000,000 since 1925, administrative savings become increasingly difficult to secure.

Establishment and Distribution of the Regular Army.—The total of Vote "A" is 148,800, as compared with 148,900 in 1930.

The distribution of the Army at Home and Abroad remains generally undisturbed. Two battalions are retained temporarily in Palestine, the normal infantry garrison of Malta being correspondingly reduced.

Strength and Recruiting.—On 1st April, 1931, the British Army, inclusive of British troops in India, will still be approximately 10,000 below establishment, the estimated intake of recruits up to that date being sufficient only to counterbalance the outflow. The whole of the shortage falls on the Army at Home, and the bulk of it on the infantry, so that the task of finding the drafts necessary to maintain the overseas garrisons has been accomplished only with great difficulty.

As the number of men leaving the Colours during the coming year will be about 30,000, the improvement in recruiting during the first seven weeks of 1931, when some 8,700 recruits have been enlisted as against 5,839 in the corresponding period last year, will need to be maintained if the existing shortage is to be reduced materially. This improvement is, however, encouraging, as it tends to show that the advantages of life in the Army are being better appreciated.

Army and Supplementary Reserves.—The Army Reserve reached its maximum of 132,000 during 1930, and the decline foreshadowed in my memorandum of last year has already begun. The strength on 1st April will be approximately 128,700, but the fall will be more rapid during the coming year owing to the large number of men who will complete their service.

Recruiting for the Supplementary Reserve has not come up to expectations; the strength will be about 17,500 instead of 20,500 as was hoped.

Vocational Training and Education.—The general conditions under which soldiers are given vocational training in preparation for their re-settlement in civil life remain unchanged. Provision has been made for the training of an increased number of students at the Army Vocational Training Centres, and a scale of fees, graded according to rank, has been introduced in substitution for a fixed fee, with the object of facilitating the attendance of the lower ranks.

During the year ended 31st December, 1930, 1,991 soldiers passed through the Training Centres, and of these some 69.4 per cent. secured employment immediately on the completion of their period of training. The corresponding figures for 1928 and 1929 were 1,598 and 81.5 per cent. and 2,193 and 76 per cent. respectively; it is hoped that there will be a considerable increase in those numbers during the coming year.

With a view to enhancing the prospects of ex-regular soldiers in finding employment in civil life, endeavours have been made to co-ordinate the efforts of those voluntary organizations which work on behalf of ex-service men and, it is hoped, will come to fruition shortly.

Owing to the present economic conditions in the Dominions it is not possible to proceed, except on a very limited scale, with the training of candidates for Oversea Settlement.

Progress in improving the education of the soldier has been well sustained; 90.35 per cent. of the total strength of the Army are now in possession of certificates of education, and no fewer than 14,415 soldiers hold either the First Class or the Special Certificate, the standard of which may be compared with the school certificate and with matriculation for a university respectively.

During the year 105 commissions were given from the ranks as compared with 93 in 1929.

Health of the Army.—The health of the Army throughout the year has continued satisfactory; there was no undue prevalence of any special disease and in comparison with the previous year the incidence of influenza was remarkably low.

The number of new officer entrants for the Royal Army Medical Corps and its Supplementary Reserve, which has been most unsatisfactory since the Great War, has fallen still lower during the past year, and the deficiency of regular officers is causing me grave concern. There has, however, recently been a marked improvement in the recruitment of other ranks.

There are now over 24,500 enrolled efficient members of Voluntary Aid Detachments, and 5,000 of this number have signed a "mobile" obligation to serve anywhere at home or abroad in an emergency. These figures show a satisfactory increase over those of last year.

Discipline.—The discipline of the Army continues to be maintained at a high standard. There was a substantial reduction in the number of trials by court-martial during the year ended 30th September, 1930, as compared with the previous year, and in the number of men under sentence of imprisonment and detention in military establishments during the first ten months of 1930 as compared with the corresponding period in 1929.

Territorial Army.—The strength of the Territorial Army (exclusive of permanent staff) on 1st January, 1931, was 6,784 officers and 127,282 other ranks, a decrease of 80 officers and 1,784 other ranks as compared with 1st January, 1930. The number of recruits in 1930 was 28,571 against 28,266 in the previous year, an increase of 305. Camp was attended in 1930 by 5,913 officers and 111,667 other ranks (exclusive of permanent staff); the corresponding figures for the previous year were 5,898 officers and 113,215 other ranks.

The mechanization of the Field Artillery of the Territorial Army will be completed on a three-year programme. Further, instead of the system of hiring 6-wheelers, for which a grant was made, 6-wheelers for both Field and Medium

Artillery will be supplied under War Department arrangements. The number of Field Batteries is 219, to which it has been increased since last year by the conversion of a Medium Battery. One hundred and ninety-nine Field Batteries will be supplied with one light 6-wheeler each, these vehicles being issued to and held on permanent charge by each unit; in London, Liverpool and Glasgow, owing to the large number of artillery units in the locality, a special scale will apply, and each 6-wheeler will be used by more than one battery. The 43 Medium Batteries will be supplied with one medium 6-wheeler each. Issues will be made as follows: in 1931 to 59 Field and 16 Medium Batteries; in 1932 to 62 Field and 16 Medium Batteries; in 1933 to 78 Field and 11 Medium Batteries. After the annual camp of the unit to which they belong, the vehicles will be available for a pool for the use of units training subsequently. The remaining vehicles required to make up the number of 6-wheelers allowed for annual training, i.e., 10 a brigade for practice and 16 a brigade for training camps, will be found by loans from Regular Army sources and when necessary in the transitional period by hiring from civilian contractors. Vehicles required for Battery Staffs will continue to be hired.

Territorial Infantry Battalions are now organized with three rifle and one machine gun companies on the model of the Regular Army.

Owing to a fall in the contract price of garments it has been found possible to reduce the clothing grant from £1 0s. 6d. to 18s. 3d. a man.

The expectations of the value to be derived from a closer association of Regular and Territorial units during the past training season were amply fulfilled, and the policy of close co-operation will be continued in 1931.

In pursuance of the policy of demilitarization laid down by me all recognition by the War Office was withdrawn from Cadet units with effect from 31st October last. Arrangements have, however, been made by which camp equipment for 25,000 persons in all during 1931 will be available, provided no cost falls on Army Votes, for use by civilian juvenile organizations recommended by the Board of Education.

Training.—One of the objects of the programme of training in 1930 was to test the results of research and experiment in types of mechanical vehicles and in their organization and handling in formations. Valuable lessons were learned and will be applied in the training during 1931, and the 6th and 7th Infantry Brigades will be retained on an experimental basis.

In August selected units of the 1st Division will be assembled at war strength at Aldershot to carry out a series of marches and battle deployments with a view to testing establishments and equipment tables. The 3rd Division will concentrate for brigade and divisional training on Salisbury Plain. The 2nd, 3rd and 5th Battalions, Royal Tank Corps, will assemble during August and September on Salisbury Plain for a period of special training in the manœuvres and tactics of armoured fighting vehicles. The 2nd, 4th and 5th Divisions and the 1st and 2nd Cavalry Brigades will carry out brigade training in the vicinity of their peace stations. The Manœuvres Act will not be put in force.

Works Services.—The modernization of barracks is being pursued as funds permit, but in present financial circumstances can only be carried out by instalments over a period of years. In addition to providing for the gradual improvement of out-of-date married quarters, and for new and modern regimental institutes and dining halls, provision has been made in these Estimates to commence the replacement of the men's barrack huts at Bordon, Blackdown, Bulford and Deepcut,

which were built during the South African War, and twenty-one new-type brick barrack blocks will be put in hand.

Armaments and Research.—During the past twelve months steady progress in the design and handling of light armoured vehicles can be recorded and valuable experience has been gained as regards their maintenance. The study of wireless communication between moving vehicles has advanced, and the improved types of field bridging equipment have proved their worth in the bridges now being constructed in the Khajuri Plain on the North-West Frontier of India.

In spite of financial stringency, satisfactory results in research and experiment have been achieved.

The Hygiene Department of the Royal Army Medical College has devised a new sterilization and filtration plant which will secure, with greater efficiency and economy, the supply of sterile and palatable water to troops on service.

Appointments and Promotions.—H.M. the King has approved of the appointment of General Sir David G. M. Campbell, K.C.B., Colonel, 9th Lancers, General Officer Commanding-in-Chief, Aldershot Command; and General Sir Archibald A. Montgomery-Massingberd, K.C.B., K.C.M.G., Colonel Commandant, Royal Artillery, Adjutant General to the Forces, as Aides-de-Camp General to the King.

H.M. the King has approved of the appointment of Colonel (temporary Brigadier) H. St J. L. Winterbotham, C.M.G., D.S.O.; of Colonel (temporary Brigadier) C. P. Heywood, C.M.G., D.S.O.; of Colonel (temporary Brigadier) A. W. Bartholomew, C.M.G., C.B.E., D.S.O., as Aides-de-Camp to the King.

H.M. the King has approved of the appointment of Brigadier-General E. Makins, C.B., D.S.O., as Colonel of The Royal Dragoons, in succession to the late Major-General Sir John Burn-Murdoch, K.C.V.O., C.B., C.M.G., C.B.E.; and of Major-General C. J. C. Grant, C.B., D.S.O., as Colonel of The King's Shropshire Light Infantry, in succession to Major-General R. E. R. Reade, C.B., C.M.G., who has attained the age limit for the appointment.

The following appointments are announced:—

Major-General W. J. Dugan, C.B., C.M.G., D.S.O., has been appointed Commander of the 56th (1st London) Division, Territorial Army, in succession to Major-General H. Isacke, C.B., C.S.I., C.M.G., with effect from 22nd June, 1931. Major-General Dugan's appointment to command the 46th (North Midland) Division, Territorial Army, has been cancelled, and Major-General O. C. Borrett, C.B., C.M.G., C.B.E., D.S.O., has been appointed to succeed Major-General Sir Percy Hambro, K.B.E., C.B., C.M.G.

Major-General Sir I. L. B. Vesey, K.B.E., C.B., C.M.G., D.S.O., to be Director of Staff Duties, the War Office, in succession to Major-General C. Bonham-Carter, C.B., C.M.G., D.S.O., with effect from 1st June, 1931.

Major-General Sir R. S. May, K.B.E., C.B., C.M.G., D.S.O., to be Commandant of the Royal Military College at Sandhurst, in succession to Major-General E. S. Girdwood, C.B., C.M.G., with effect from 1st September, 1931.

Major-General H. C. Jackson, C.B., C.M.G., D.S.O., has been appointed Commander of the 2nd Division, in succession to Lieutenant-General T. A. Cubitt, K.C.B., C.M.G., D.S.O.

Major-General C. Bonham-Carter, C.B., C.M.G., D.S.C., has been appointed Commander of the 4th Division, in succession to Major-General A. R. Cameron, C.B., C.M.G., with effect from 1st June, 1931.

Major-General R. G. Finlayson, C.M.G., D.S.O., has been appointed Commander of a District (First Class) in India, with effect from June, 1931.

Major-General C. A. Ker, C.B., C.M.G., C.B.E., D.S.O., has been appointed Commander of a District (First Class) in India, with effect from June, 1931.

Major-General C. G. Fuller, C.B., C.M.G., D.S.O., has been appointed Commander of the 48th (South Midland) Division, Territorial Army, in succession to Major-General Sir I. L. B. Vesey, K.B.E., C.B., C.M.G., D.S.O., with effect from 1st June, 1931, and Colonel (temporary Brigadier) Sir James L. G. Burnett of Leys, Bt., C.M.G., D.S.O., has been appointed Commander of the 51st (Highland) Division, Territorial Army, in succession to Major-General Sir W. M. Thomson, K.C.M.G., C.B., M.C., with effect from 16th June, 1931.

The following Promotions have been made :—

Lieutenant-Generals Sir W. C. G. Heneker, K.C.B., K.C.M.G., D.S.O., and Sir C. D. Shute, K.C.B., K.C.M.G., to be General.

Major-Generals Sir W. E. Ironside, K.C.B., C.M.G., D.S.O., and A. R. Cameron, C.B., C.M.G., to be Lieutenant-General.

Colonel (temporary Brigadier) H. Karslake, C.B., C.M.G., D.S.O., A.D.C.; Colonel C. M. Wagstaff, C.B., C.M.G., C.I.E., D.S.O.; Colonel H. Needham, C.M.G., D.S.O.; Colonel G. Thorpe, C.M.G., D.S.O.; Colonel A. E. MacNamara, C.B., C.M.G., D.S.O.; Colonel G. W. Howard, C.M.G., D.S.O., to be Major-Generals.

Dress—Change of Facings: (i) The Leicestershire Regiment.—H.M. the King has approved of the facings of The Leicestershire Regiment being changed from "White" to "Pearl Grey."

(ii) Royal Army Pay Corps.—H.M. the King has approved of the facings of the Royal Army Pay Corps being changed from "Yellow" to "Primrose Yellow."

The following modifications in the pattern of Mess Jacket for officers has also been approved :—

(*a*) The jacket to have a blue cloth "step" collar of the same material as the jacket, with primrose yellow silk facings on the lapel ¾-inch from the edge, instead of a "roll" collar with yellow cloth facings.

(*b*) The cuffs to be of the same cloth as the jacket with a 2½-inch slit and two small buttons.

The Army Educational Corps: Extracts from The Secretary of State for War's Statement.—(1) The Army Educational Corps, consisting of officers, warrant officers and non-commissioned officers, was formed after the war in replacement of the Corps of Army Schoolmasters to provide increased facilities for the adult education of the soldier and (with the aid of Army schoolmistresses for girls' and infants' and junior boys' classes) to teach the children of soldiers in Army schools where civilian schools are not available. So far as adult education is concerned the system affords the soldier opportunity for progressive education up to that qualifying for a special certificate (university matriculation standard). The standard of attainment in Army children's schools is on a par with that in civil schools.

(2) As regards the allotment of duties in the Corps, broadly speaking the officers of the Corps are engaged in the general organization, inspection, administration and supervision of educational training in the Commands and in the inspection and administration of all Army children's schools; and in giving instruction at the Army schools of education and at certain other educational establishments while

up till now they have also performed some of the general teaching duties. The remainder of the teaching is carried out by warrant officers and sergeants of the Corps (aided so far as certain work is concerned by regimental officers, warrant officers and non-commissioned officers).

3. The present reorganization of the Corps, while maintaining the general principles on which the work has been based has two main objects in view:

(*a*) To improve the prospects of the *personnel* of the Corps. Since the Corps was originally formed there has been a steady reduction in its strength accompanied by great stagnation in promotion, and the lack of prospects has given rise to considerable dissatisfaction;

(*b*) To relieve the officers, normally, of all teaching duties, except for the instruction given at the Army Schools of Education and certain other educational establishments.

In the scheme of reorganization the establishment of officers has been considerably reduced, the work of inspection and supervision being re-arranged. For the reduced establishment substantially better prospects are offered, both by the introduction of time promotion (for subalterns) and by increasing the emoluments of certain posts to correspond more fairly with the responsibilities now involved. On the other hand, the actual teaching staff of warrant officers and non-commissioned officers has been increased, and additional opportunities have been afforded to them of promotion to commissioned rank. The reorganization involves no extra cost to the State.

4. The present and future establishments of the corps are as follow:—

A.—PRESENT ESTABLISHMENT.

	Lieut.-Colonels	Majors	Captains	Subalterns	Total Officers	Warrant Officers, Class I.	Warrant Officers, Class II.	Sergeants	Total Other Ranks
Imperial	4	10	33	55	102	47	68	150	265
India..	1	5	14	31	51	41	29	55	125
Total	5	15	47	86	153	88	97	205	390

B.—FUTURE ESTABLISHMENTS.

	Colonels	Lieut.-Colonels	Majors	Captains and Subalterns	Education Officers	Total Officers	Warrant Officers, Class I.	Warrant Officers-Class II.	Sergeants	Total Other Ranks
Imperial ..	1	3	7	55	6	72	53	73	167	293
India* ..	1	—	3	24	—	28	41	29	55	125
Total ..	2	3	10	79	6	100	94	102	222	418

* Does not include the Indian Continuous Service Cadre of the Army Educational Corps which is to consist at present of 2 Majors, 12 Captains and Subalterns, increasing eventually to a probable total of 18 or 19 officers.

THE ARMY IN INDIA

NEW APPOINTMENTS.—Major-General J. F. S. D. Coleridge, C.B., C.M.G., D.S.O., Indian Army, has assumed command of the Peshawar District, vice Lieutenant-General Sir Charles Godwin, K.C.B., C.M.G., D.S.O., Indian Army.

Major-General C. J. B. Hay, C.B., C.M.G., C.B.E., D.S.O., commanding the Sind (Independent) Brigade Area, has been appointed Commander, Lucknow District.

TERRITORIAL ARMY

AIDES-DE-CAMP TO THE KING.—The King has approved that the rules governing the appointment of officers of the Territorial Army as additional Aides-de-Camp to His Majesty should be amended to provide for the retirement of future holders of the appointment on completion of ten years in the appointment or on attaining the age of 55 years (whichever gives the holder the longer tenure of his appointment). At present, officers (who must hold the rank of Colonel on appointment) relinquish the honour automatically on attaining the age of 67 years, and the modification of the rules which has now been approved is designed to increase the number of officers who can enjoy the honour of serving the King as Aide-de-Camp, without increasing the present establishment.

Present holders of the appointment are not covered by the revised rule. But, in order to make way for the appointment of other officers, the four officers who have already served in the appointment ten years and have reached the age of 55—Brigadier-General the Rt. Hon. the Duke of Athol, Brigadier-General the Viscount Hampden, Colonel the Lord Lovat and Colonel the Hon. A. G. Brodrick—have placed their resignations in the hands of the King.

"DARTMOUTH CUP" COMPETITION RESULT.—It is announced that the winners of the "Dartmouth Cup" Competition for 1930 are the 1st Battalion, The Cambridgeshire Regiment, with the figure of merit of 100.

The following units had figures of merit of not less than 90:—

9th Bn. The Middlesex Regiment	99·9
90th Field Brigade, Royal Artillery	99·9
4th Bn. The Northamptonshire Regiment	99·9
5th Bn. The Somerset Light Infantry	99·8
6th Bn. The Cameronians	99·8
5th Bn. The York and Lancaster Regiment	99·8
5th Bn. The Queen's Own Royal West Kent Regiment	99·8
6th/7th Bn. The Black Watch	99·7
16th London Regiment	99·7
The Warwickshire Yeomanry	99·7
5th Bn. The Bedfordshire & Hertfordshire Regiment	99·7
71st Field Brigade, Royal Artillery	99·7
The Hallamshire Bn. The York & Lancaster Regiment	99·4
9th Bn. The Manchester Regiment	99·4
6th Bn. The Essex Regiment	99·4
Lancashire & Cheshire Heavy Brigade, Royal Artillery	97·8
11th Brigade, Royal Horse Artillery	96·6
5th/6th Bn. The Argyll & Sutherland Highlanders	95·3

The Cup was presented by the Rt. Hon. the Earl of Dartmouth in 1925, to be competed for annually by units of the Territorial Army. The conditions governing

the competition for the Cup may be varied from year to year, but it was decided for the year 1930 again to award the Cup for proficiency in signalling in Yeomanry, Artillery and Infantry units of the Territorial Army. The proficiency of each unit competing was assessed by means of a figure of merit based on the results of the annual classification of the unit signallers.

DOMINION FORCES

REGIMENTAL ALLIANCES.—H.M. The King has approved of the following Alliances :—

6th Battalion, Australian Infantry, Australian Military Forces, to The Royal Fusiliers (City of London Regiment).

12th Battalion, Australian Infantry, Australian Military Forces, to The Suffolk Regiment.

The Princess Louise Fusiliers, Non-Permanent Active Militia of Canada, to The Royal Inniskilling Fusiliers.

The Battleford Light Infantry, Non-Permanent Active Militia of Canada, to The Duke of Cornwall's Light Infantry.

25th Battalion, Australian Infantry, Australian Military Forces, to The King's Own Scottish Borderers.

39th Battalion, Australian Infantry, Australian Military Forces, to The Dorsetshire Regiment.

47th Battalion, Australian Infantry, Australian Military Forces, to The Loyal Regiment (North Lancashire).

AUSTRALIA

Major-General J. H. Bruche, C.B., C.M.G., on completing his two years' appointment as Senior Officer representing the Military Board in the Military Section of the High Commissioner's Office, London, and Representative of the Australian Section of the Imperial General Staff at the War Office, has vacated this appointment.

In the interests of economy the Commonwealth Government will not fill the appointment. Mr. Thomas Trumble, C.M.G., C.B.E., Official Secretary in Great Britain of the Commonwealth of Australia, will deal with military matters and be known as the Defence Liaison Officer. Paymaster-Lieutenant-Commander A. Freyer, R.A.N., will represent the Royal Australian Navy, Major F. H. Berryman, D.S.O., *p.a.c.*, Australian Staff Corps, will act as military representative, while Squadron Leader T. R. Marsden, D.S.O., will be the Royal Australian Air Force representative in Mr. Trumble's Department.

SOUTH AFRICA

Lieutenant-General H.R.H. the Prince of Wales and Duke of Cornwall, K.G., K.T., K.P., G.C.S.I., G.C.M.G., G.C.I.E., G.C.V.O., G.B.E., M.C., Personal Aide-de-Camp to H.M. The King, has accepted the appointment of Colonel-in-Chief of the 8th Infantry (Transvaal Scottish) of the Active Citizen Force.

FOREIGN

BELGIUM

FORTIFICATIONS.—It is reported in the press that the forts of Liege, Namur and Antwerp will be brought up to date in 1931. . .

According to the press the general staff plans do not include any fortifications for Verviers-Spa, Stavelot, Vielsam-Houffalize-Bastogne, Arlon.

LINGUISTIC QUESTION.—One difficulty which has been brought out by the discussion of the linguistic law is that, owing to the rigidly territorial system of recruiting, it is difficult in technical units recruited in agricultural districts to find a sufficiency of recruits possessing the necessary educational qualifications for training as Reserve non-commissioned officers and officers of the technical branches.

It has been suggested that this should be remedied by substituting a central school for non-commissioned officers and officers for the present system of regimental school units.

ITALY

An official communiqué has reported the occupation of the oasis of Kufra by Italian troops on 24th January. This oasis lies in the interior of Cyrenaica and has always been regarded as the chief stronghold of the Senussi; its capture probably signifies the establishment of Italian rule throughout Libya.

During last winter's campaign, Italian forces succeeded in effectively occupying the greater part of Tripolitania, which forms the western portion of the colony of Libya. In Cyrenaica, however, little progress was made and, although some tribes submitted to Italian rule, others proved recalcitrant both to peaceful persuasion and to force. The Senussi constituted the backbone of this resistance.

According to the Italian report the present campaign began in December. Two columns of troops, starting from bases distant about 400 miles from Kufra, concentrated in the neighbourhood of Bir Zighen, about 75 miles north-west of Kufra, on 9th January. From this point the advance was continued and a successful engagement with the tribesmen took place on 19th January, which opened the way for the occupation of the oasis five days later. Italian casualties are stated to have been two officers and two men killed, and sixteen men wounded, whilst the Senussi lost about one hundred killed. The composition of the Italian force is not known but a squadron of aeroplanes is reported to have taken part.

The population is said to be returning to the various towns and villages in the oasis and this confirms the Italian claim to be in control of the whole Kufra area.

MOROCCO

RAID ON THE DOUI MENIA.—According to news from Oran some 200 native raiders attacked the tents of a friendly tribe, the Doui Menia, on the southern confines of Morocco and Algeria on 25th December. The raiders made off with one hundred camels but were overtaken by the Colomb-Bechar air squadron, the mobile column from Abadla and a squadron of armoured cars. A stubborn engagement followed in which the French forces had slight, but the raiders heavy, losses.

NORWAY

ARMY ORGANIZATION.—On 1st January, 1930, the new army organization came into force. This has involved a total reduction of :—

Infantry	.. .. ..	From 56 to 34 battalions.
Cavalry	.. .. ..	From 20 to 12 squadrons.
Artillery	.. .. ..	From 39 to 37 batteries.

The army remains organized in 6 divisions, four of which consist in peace of 6 battalions and two of 4 battalions only.

NEW ARMAMENT.—During the summer a start was also made with the organization of machine-gun companies; under the new organization an infantry battalion consists of 3 rifle companies, and 1 machine-gun company of 9 guns. The weapon selected is the Colt-Browning with a calibre of 7.92 mm., while the calibre of the infantry rifle is 6.5 mm.

UNITED STATES OF AMERICA

ARMY ESTIMATES.—The estimates for the financial year 1931-32 for the military activities of the War Department amount to £69,500,000 approximately, which is £500,000 less than the total appropriated for the purpose last year. Further details will be published after the estimates have been examined by Congress when further reductions will probably have to be recorded.

For the past five years the military budget has been steadily increasing; the tendency towards economy shown by the latest estimates is the more noteworthy in view of the frequently expressed desire of the General Staff to increase establishments and to improve pay and housing conditions.

AIR NOTES

ROYAL AIR FORCE

Air Estimates 1931-32.

The following are extracts of the more important sections of the Memorandum of the Secretary of State for Air which accompanied the Air Estimates for 1931 :—

Financial Summary.—The Estimates show a total of £18,100,000, being an increase of £250,000 on the current year's figure of £17,850,000. The gross total is up by £273,400 at £21,197,200, as compared with £20,923,800 in 1930.

There is thus again a slightly larger rise in the gross than in the net figure which is due to an increase of £23,400 in appropriations-in-aid. These latter however, include provision of the necessary funds for the British entry in the forthcoming contest for the Schneider Trophy, without which they would show a decline. Subject to this special factor on the present occasion and the inclusion in these Estimates of the largely increased sum of £155,000 payable by the Dominion and Colonial Governments concerned as a contribution towards the cost of the forthcoming African service, the gross figures are the truer index of comparative air expenditure from year to year.

It is therefore highly satisfactory that, despite the increase in the strength of the Royal Air Force since 1925, the gross total for 1931 remains substantially lower than the corresponding figure for six years ago. The achievement of this result has, of course, been assisted by the smaller sum taken for airships, the further fall in prices during the past twelve months, and the estimated reduction in rates of remuneration related to the cost of living, which factors, however, have been partially offset by the need for an extra day's provision owing to 1932 being a leap year. But in the main it has only been possible as a result of the exercise of the most rigid economy, the continuous review of establishments both at home and abroad, and the pruning of all services to the limit compatible with efficiency.

Policy.—There has been no alteration during the current year in the main features of air policy. His Majesty's Government, having regard to the fact that Great Britain still ranks fifth of the world's air powers in terms of first-line strength and to the marked growth in recent years of air expenditure abroad, have approved a further modest instalment of the home defence scheme, which will proceed in the coming year in accordance with programme. It is their earnest hope that the forthcoming Disarmament Conference will bring about a general reduction in air armaments (the rapid development of which the world over they view with profound disquiet) and remove the present serious disparity between the Royal Air Force and foreign air services.

Strength and Distribution of the R.A.F.—During the year ending 31st March, 1931, one squadron of flying boats and two new flights of the Fleet Air Arm will have been added to the strength of the regular Air Force, and in addition one

new cadre squadron is being formed. These developments are as forecast when Air Estimates for 1930 were presented, and on their completion the strength of the Air Force will amount to 72 regular squadrons, including the equivalent of 13 squadrons in the Fleet Air Arm. There will be in addition 13 non-regular squadrons, of which eight belong to the Auxiliary Air Force and five are organized on a cadre basis.

In 1931 three new regular squadrons will be added to the Home Defence Force, which will bring the number of such squadrons up to 29 out of the total of 39 comprised in the programme formulated in 1923. The strength of the Fleet Air Arm will be increased by one flight.

Personnel.—Following on the comprehensive review of the problem of the General Duties Branch completed two years ago, the future requirements for officers of the Stores Branch have been under examination. The principle has again been followed of limiting the number of officers who will look to the Service for a life career to the minimum sufficient to provide a highly trained nucleus. By such limitation money has been found to give to this nucleus substantially improved prospects, which in turn should ensure a flow into this branch of officers of ability and also permit of their promotion, in normal circumstances, at ages sufficiently early to allow full scope for the development of initiative and responsibility.

The remaining posts, which are in the junior ranks, will be filled by two other categories of *personnel*. The first consists of retired officers who will be employed as civilians and will be gradually substituted for serving officers at many stations, The second category will be found by the promotion of a substantial number of warrant officers drawn from all trades. The Service will thus gain a body of valuable stores officers, and at the same time a fresh avenue to commissioned rank will be provided for the best of its warrant officers. An important improvement will, therefore, be made in the career which the Royal Air Force offers to airmen, who hitherto have been able to secure commissions only through two channels—namely: (1) selection while aircraft apprentices for cadetships at Cranwell; and (2) appointment of airman pilots to commissions in the General Duties Branch.

This scheme is being brought into operation gradually over a period of years as the older of the present stores officers, whose interests have been carefully safeguarded, retire in the normal course. When fully operative it will result in a substantial saving as compared with the cost of the Stores Branch as at present constituted.

In pursuance of the policy of relieving officers of such of the technical duties of the Service as can properly be performed by airmen, the experiment is being tried of appointing warrant officers and senior N.C.O.s in lieu of flying officers as armament instructors in squadrons. Further developments on the same lines are in contemplation. As a consequence a small saving in officer *personnel* will be effected and the career open to airmen will be still further improved.

Training and Education.—As a result of reorganization and economies effected in the use of officer personnel, it has been found possible to close down the flying training school at Netheravon, a station which it is now desired to allocate to home defence, without providing a fresh school elsewhere in place of it. Apart from the training given at the Royal Air Force College, present requirements can now be met by the three remaining flying training schools in this country, and by the school in Egypt.

Pilots are now being trained in "instrument" or "blind" flying, i.e., in flying by the aid of instruments alone. This training is still in an experimental stage, but should prove of considerable value in teaching pilots to fly in and to navigate through clouds.

There has been no change in the general policy of technical training and education. A satisfactory feature has been the steady increase over the past four years in the number of boys of good secondary education applying for entry to Halton as aircraft apprentices, due to the ready co-operation of local education authorities and headmasters combined with a growing realization of the advantages which the Service can offer. Vote 6 (Educational Services, at a net figure of £484,000 shows a small decrease of £9,000, due mainly to minor reductions and adjustments at certain establishments.

Reserve and Auxiliary Forces.—Vote 7 shows little variation from the 1930 Estimates. The net total of the Vote is £599,000, an increase of £8,000 over last year's figure. Extra expenditure is anticipated under several subheads, chiefly on account of increased provision for the more recently formed cadre and auxiliary squadrons, and for extra flying on the part of pilots of the Royal Air Force Reserve, but this is being met for the most part by compensating savings.

The strength of the cadre and auxiliary squadrons has again, generally speaking, been well maintained. The amount of flying done by these non-regular units grows year by year and the high standard of general efficiency achieved, which was conspicuously evidenced during the annual air exercises, is a tribute to the quality of the personnel of all ranks.

The University Air Squadrons at Oxford and Cambridge, besides continuing to discharge effectively the other functions for which they were created, have served to maintain a satisfactory flow of candidates for commissions in both the Regular and non-Regular forces. The increased flying carried out by the members of these squadrons has been a noteworthy feature of the year's work.

Technical Equipment.—Provision is made for the re-armament with aircraft of new design of twelve squadrons, and under the 1931 programme the last of the so-called "War-time" types will finally disappear.

Slotted wings (either operating automatically or under the pilot's control) are now fitted to fifteen types throughout the Service, the fitting of four more types is on the point of completion, and the principle is being still further extended. In sum, 80 per cent. of aircraft are now equipped or will shortly be equipped with slotted wings.

Parachutes are now available for every officer and man in the air, and on completion of the 1931 programme provision will have been made for their carriage in all types of aircraft in service. The new quick release gear for use over water has proved satisfactory, and deliveries of parachutes fitted with this gear have begun.

Research and Technical Development.—The reorganization of the Royal Aircraft Establishment at Farnborough will continue during the year. Provision is made in these Estimates for the cost of the new wind tunnel and the seaplane testing tank to be installed at this establishment. The 24 ft. wind tunnel, which will be large enough to enable full-scale experiments to be made on the airscrews, engines, and fuselages of aircraft, has now been tested in model form, and its construction will be put in hand shortly. The seaplane tank is nearly complete, and will be available for use during the year.

The compressed air tunnel (in which the variable density of the air increases the accuracy of data obtained from scale models) will be ready in the course of a few weeks. This tunnel is being erected at the National Physical Laboratory at Teddington.

Two new monoplanes of the "parasol" type have been designed and constructed for research purposes. These are so arranged that the incidence of the forces acting upon their wings can be accurately measured in actual flight; and their construction also allows of wings of different sections being fitted as necessary for investigation and experiment.

A new attack has been made upon the problem of fire in aircraft by the development of a flame trap to be incorporated in the induction system of the engine; this device, while not interfering with the flow of gas to the cylinders, eliminates the flame of a "back-fire." Considerable progress has also been made recently in the fire-proofing of the fabric parts of aircraft.

The silencing problem is being closely studied. Accurate measurements of noises have been made with "audiometers" in air liners of Imperial Airways and of foreign operating companies, and comparative data have been obtained between geared and ungeared engines. The lower speed of the airscrew with the former type has been proved to be beneficial, and further experiments are being made with engine silencers and with sound-proof materials for the construction of cabins.

Appointments.

Air Vice-Marshals.—G. L. N. Newall, C.B., C.M.G., C.B.E., A.M., to Headquarters, Wessex Bombing Area, as Air Officer Commanding, on relinquishing the appointment as Deputy Chief of the Air Staff; Sir John M. Steel, K.B.E., C.B., C.M.G., to Headquarters, R.A.F., India, supernumerary pending taking over command; both to date 6th February.

Air Commodores.—C. S. Burnett, C.B., C.B.E., D.S.O., to Air Ministry as Director of Operations and Intelligence and Deputy Chief of the Air Staff, to date 6th February; W. R. Freeman, D.S.O., M.C., to Headquarters, R.A.F. Transjordan and Palestine, as Air Officer Commanding, to date 1st December, 1930; P. H. L. Playfair, M.C., to Headquarters, R.A.F., India, as Chief Staff Officer, to date, 28th March, 1931; R. P. Ross, D.S.O., A.F.C., to Headquarters, R.A.F., Middle East, as Chief Staff Officer, to date 23rd January; The Hon. J. D. Boyle, C.B.E., D.S.O., to Headquarters, Air Defence of Great Britain, for duty as Chief of the Air Staff to date 1st April; F. W. Bowhill, C.M.G., D.S.O., from Director of Organisation and Staff Duties to Air Officer Commanding Fighting Area, to date 5th May.

Chief of the Air Staff's Tour.

Air Chief Marshal Sir John Salmond, K.C.B., C.M.G., C.V.O., D.S.O., has been making a tour of the Royal Air Force Stations in Malta, Egypt, Palestine and Transjordan. The sea part of his journey was performed in a Blackburn "Iris III" flying boat, one of No. 209 (Flying Boat) Squadron. This boat and another which had been acting as escort returned to their base at Mountbatten, Plymouth, on 22nd April, having flown in all 4,800 miles.

Cape Flight.

A flight of three Vickers Victoria troop carriers belonging to No. 216 (Bomber) Squadron, Royal Air Force, left Heliopolis on 12th January and flew to the Cape in pre-determined stages arriving on 7th February. The return journey was commenced on 11th February, and the aircraft reached Heliopolis on 11th March. The total distance flown was 11,242 miles. One of the objects of the exercise was to give experience in air travel to detachments of native troops which were carried in the aeroplanes.

Singapore Air Base.

In reply to a question in the House of Commons the Under-Secretary of State for Air said that approximately £426,000 would have been spent on the Air Base at Singapore by 31st March. The total cost of the work was estimated at £576,000, and he thought it would be completed in its essentials in 1933.

Organization.

No. 1 Flying Training School, Netheravon, was disbanded on 1st February, 1931.

The first of the three new Squadrons for Home Defence, provision for which is made in the Air Estimates this year, was formed at Upper Hayford on 1st April. The Squadron is known as No. 40 (Bomber) Squadron, and is equipped with Gordon aeroplanes (Fairey III F., with Armstrong-Siddeley Panther engines).

No. 500 (Cadre) Squadron, which was formed in December of last year, has now been stationed at Manston Aerodrome, near Ramsgate. It includes one flight of regular personnel and is equipped with two Avro training machines and two Vickers Virginias. The squadron is under the command of the Commanding Officer, Manston Station.

Two new Torpedo Bomber Flights, part of the Fleet Air Arm, were formed at Gosport in March last. They are numbered No. 465 and No. 466, and are equipped with Blackburn Ripon aeroplanes.

Three Short Rangoon flying boats left Plymouth on 14th February to fly to Basrah to re-equip No. 203 (Flying Boat) Squadron. They encountered bad weather conditions on the journey and did not reach Basrah until 22nd April.

Material.

Supply of New Types of Aeroplanes.—Air Ministry Orders announced that the following were the approximate dates on which new types of aeroplanes would be supplied during the next few months:—The Armstrong-Whitworth Atlas (Jaguar engine) to replace the Bristol Fighter in the Communication Flight, Andover, and the Station Flight, Duxford, in April; the School of Photography, Farnborough, in May, and the Royal Air Force Depot, Abukir, in June.

The Fairey III "F" (Fleet Air Arm type—Napier engine) to replace the Blackburn (Napier engine) in No. 449 (Fleet Spotter Reconnaissance) Flight, H.M.S. "Courageous," in May or June.

The Hawker Hart (Rolls-Royce "F" engine) Fighter, to replace the Gloster Gamecock (Bristol Jupiter engine) in one Flight of No. 23 (Fighter) Squadron in May.

The Hawker Nimrod (Rolls-Royce "F" engine) to replace the Fairey Flycatcher (Siddeley Jaguar engine) in No. 402 (Fleet Fighter) Flight in H.M.S. "Eagle" in June; in the Base Training Squadron at Gosport and in the Base Training Squadron at Leuchars in July.

The Hawker Fury (Rolls-Royce "F" engine) to replace the Armstrong-Whitworth Siskin (Jaguar engine) in No. 43 (Fighter) Squadron in April;

The Westland Wapiti VIII (Bristol Jupiter engine) was shipped to India in April, and this type, which has been adapted for Army co-operation work, will be the new equipment of one of the Army Co-operation Squadrons at present equipped with Bristol Fighters. Hitherto all the day-bomber squadrons in India have been equipped with Westland Wapitis and all the Army Co-operation Squadrons with Bristol Fighters.

It is also officially announced that No. 10 (Bomber) Squadron is being re-equipped with Handley-Page Hinaidis, and No. 203 (Flying Boat) Squadron with Short Rangoon flying boats.

Fatal Accidents.

An Iris flying boat of No. 209 (Flying Boat) Squadron based on Mountbatten, was wrecked on landing on 4th February, and Wing-Commander C. G. Tucker, who was piloting the aircraft, Flying Officer Wood and seven airmen lost their lives. Two other officers were injured, and another airman was rescued uninjured. In answering a question in the House of Commons, the Secretary of State for Air said that the accident "would not have occurred but for direct disobedience of orders on the part of the individual officer."

The Air Ministry announce with deep regret that Air Vice-Marshal Fenton Vesey Holt, C.M.G., D.S.O., Air Officer Commanding Fighting Area, Air Defence of Great Britain, and Flight Lieutenant H. M. Moody, M.C., lost their lives as the result of a collision which occurred at Seahurst Park, Sussex, on 23rd April, between a Moth aeroplane of No. 24 (Communication) Squadron, Northolt, Middlesex, and a Siskin aeroplane of No. 43 (Fighter) Squadron, Tangmere, Sussex. Flight Lieutenant Moody was the pilot of the Moth. The pilot and sole occupant of the Siskin was not injured. The Siskin aeroplane was flying in formation at the time, and it was one of a squadron which was in the process of making a salute dive when the accident occurred.

Air Vice-Marshal Holt had only held command of the Fighting Area since 1st April.

Fleet Air Arm.

In reply to a question in the House of Commons, the First Lord of the Admiralty said that the present number of aircraft available for service with the British Fleet was 142. From published information it was estimated that the number with the United States Navy was 255, excluding 51 first-line aircraft, which, with their crews, were carried in fleet tenders, and also shore-based aircraft of the United States Naval Air Service. (*See also* Navy Notes, *p.* 439).

EGYPT

An official of the Egyptian State Telegraphs Administration and his companion, who had been lost for two days in the desert, 115 miles from Cairo, were located and rescued on 18th February by Royal Air Force aeroplanes.

IRAQ

The following report of operations carried out by the Royal Air Force in conjunction with the Iraqi Army and Police appeared in the *Times* of 9th April :—

" Operations are now in progress in Kurdistan, in which the Royal Air Force is co-operating with the Iraqi Army and Police. They are directed against the Kurdish outlaw, Sheikh Mahmud, who, in defiance of the undertaking he gave three years ago, entered Iraq from Persia last September with a band of brigands.

" Mahmud has been attacking isolated Iraqi police posts, and attempting to incite the Kurdish tribes to join him in a rebellion against the Iraqi Government by representing himself as the champion of Kurdish nationalism. So far he has had little success. Few Kurds desire to change their present lot for subjection to Mahmud, but, naturally, the tribes are closely watching events. Many would, doubtless, be tempted to join Mahmud should he score a victory over the Government's forces. Fortunately that has so far been prevented.

" The role of the R.A.F. is primarily to track down parties of rebels, who by reason of their greater mobility are able to elude the ground troops, and engage them until the ground troops come up. Owing to the practice adopted by the rebels of taking shelter in villages on the approach of aircraft, it is necessary on occasion to attack villages from the air. This, however, is only done after the rebels have been definitely located in villages, and after printed proclamations have been dropped on the villages warning the inhabitants that air action would follow after a stated interval. The shelter of the villages is thus denied the rebels, while the inhabitants are able to remove to a place of safety during the progress of operations.

" So far the total casualties on both sides are insignificant."

AVIATION IN FOREIGN COUNTRIES

CHINA

Messrs. Vickers have sent a Vespa two-seater army co-operation and reconnaissance biplane to Shanghai for demonstration before the Chinese Nationalist Government.

FRANCE

[Co-ordination of Air Forces.—On 9th February Marshal Pétain relinquished his office as Vice-President of the Supreme War Council to become Inspector-General of the Air Defences over land. This was the outcome of a decision made by the Supreme Council of National Defence on 8th January, that it was desirable to regulate and co-ordinate the work of the Ministries of War, Marine, Air and Colonies, all of whom had some share in the conduct of air defence.

Marshal Pétain is now charged with all the defensive side of aerial warfare, including the protection of Paris and other vital centres against air attack. This includes measures for the training, protecting and moving of civilians in the event of such attacks, especially where gas may be used against towns.

GERMANY

AIR ESTIMATES, 1931–32.—A sum of 43,100,900 Reichmarks has been proposed for German Civil Aviation in the recently published estimates for the financial year 1931–32 as compared with 45,777,550 Reichmarks voted in 1930–31. The following are the principal items of interest :—

	1931–32 (*Estimates*) R.M.	1930–31 (*Amounts voted*) R.M.
For technical advancement of aviation	5,445,000	5,445,000
For development of the Aircraft Industry	7,000,000	7,000,000
For development of public air traffic :—		
(*a*) European routes	15,825,000	16,000.000
(*b*) Non-European routes	3,000,000	3,00,000
For training of professional civil pilots	2,277,000	2,300,000
For development of airship traffic ..	1,100,000	500,000
For amortization of loan to the Deutsche Lufthansa	2,000,000	2,000,000

The saving of 2,676,650 R.M. in the Estimates is effected chiefly by the disappearance of an item of 2,650,000 R.M. voted in 1930–31 for the new Zeppelin shed at Friedrichshafen, construction of which was completed early in 1930.

GREECE

Six Fairey III " F " aeroplanes were handed over to representatives of the Greek Government at Hamble on 11th March. The machines are to be stationed at the Naval Air Station at Phaleron Bay near Athens.

ITALY

The Air Estimates for 1931–32 amount to 752,890,000 lire, an increase of 34,800,000 lire over the Estimates for 1930–31. The major part of this increase is allotted to the votes for technical equipment and the maintenance of air stations, in continuance of the Italian air policy of the past few years of concentrating upon re-equipping the Air Force with up-to-date material, and improving and extending the accommodation at their air bases.

JAPAN

In connection with the reorganization and expansion of the Naval Air Service, alluded to in last quarter's JOURNAL, and in addition to the increased number of aircraft to be carried in ships, there are to be two new shore-based squadrons. Provision for these falls to the periods 1938–1939. The shore-based squadrons by then will, according to Press reports, amount to :—

1 Squadron of large flying boats of 2 aircraft per squadron.
3 Squadrons of medium flying boats of 6 aircraft per squadron.
7 Squadrons of torpedo bombers of 16 aircraft per squadron.
3 Squadrons of fighters with 16 aircraft per squadron.

A total of 14 squadrons with 180 aircraft.

SOVIET-UNION

The Kara Expedition, which came to an end in the autumn of 1930 and in which three "Dornier Wal" flying boats took part, again proved the value of aircraft in guiding vessels through the ice-fields of the Arctic Ocean, and thus effecting a saving of time and money. In 1930, the expedition was able to dispense with the costly services of the icebreaker "Krassin," while the icebreaker "Lenin," stationed in Yugorski Bay, was not once called upon to pilot vessels through the ice floes. Aircraft gave all the information needed regarding channels free from heavy pack-ice. These aircraft also undertook air survey work and, it is claimed, discovered several new islands.

It was intended to make use of aircraft in several other expeditions during the winter 1930–31.

UNITED STATES OF AMERICA

ARMY AIR CORPS FIELD EXERCISES, MAY, 1931.—The Army Air Corps is holding its annual field exercises in May, 1931, when units from various parts of the U.S.A. are being concentrated at Wright Field and Fairfield, near Dayton, Ohio, to form an "air division."

The air division is composed of the following units:—

Headquarters Staff.
Fighter Wing, consisting of three fighter groups.
Bombardment Group.
Observation Wing, consisting of four observation groups, with National Guard Squadrons attached.
Attack Group.
Transport Group.

The Headquarters Staff will be a mobile flying organization, and is to accompany the division as an integral part on all its movements.

The following aircraft are to be employed in the exercises:—

205 Fighting aircraft.
335 Observation aircraft.
51 Attack aircraft.
36 Bombing aircraft.
45 Transport aircraft.

The full programme to be followed in the exercises has not been made public, but the following information has been issued.

The air division will assemble between May 15–17; the next three days will be devoted to formation and combat practices by the entire division. On 21st May the division will fly to Mitchel Field, Long Island, New York, and from this point war conditions will be simulated, and various manœuvres will be carried out over the more important cities on the Atlantic seaboard. The exercises will conclude on 31st May, at Washington, and on the following day the various units will return to their home stations.

The principal features of the exercises may be classified as: problems of command incidental to handling huge volumes of personnel and equipment in the air and on the ground; expanding and developing tactical theories; teaching the various Air Corps units to function as a team; and the subjection of aircraft and personnel to exacting endurance tests.

AIRSHIP NOTES

GREAT BRITAIN

Report of the "R.101" Enquiry.

The Report of the Rt. Hon. Sir J. A. Simon, one of His Majesty's Counsel, who was appointed by the Secretary of State for Air on 22nd October last to investigate the causes and circumstances of the accident to the airship "R.101," which occurred near Beauvais, in France, on 5th October, 1930, was issued by H.M. Stationery Office on 31st March.[1] The essential facts brought out by the Report were as follows:—

"The immediate cause of the disaster," according to the Report, "was a sudden loss of gas in one of the forward gasbags at a time when the nose of the airship was being depressed by a downward current of air. The rapid gas leakage is accounted for by the assumption that, in the rough weather, some of the fabric at the nose was torn and a forward gasbag exposed to buffeting by the wind which might have caused a rent."

"How this loss of gas started can never be definitely ascertained; the weather was exceptionally bad and the gasbags were hard up against padded projections which may have begun to wear the fabric; the bumpiness of the wind and the pitching of the ship would intensify the strain; and earlier flights had indicated the possibility of leakage through chafing, or if the vessel rolled through an unusually large angle, through intermittent opening of the gas valves. But it seems very probable that the more serious and sudden loss of gas which followed was connected with a specific misfortune such as the ripping of the fore part of the envelope. Something of this sort had happened on a previous occasion, and no amount of care could secure that it would never happen again. If a rip had begun in the fore part of the envelope it would tend to develop into a larger tear, which would both check the speed of the "R.101" through the air and expose the gasbags to additional strain. This seems the most probable explanation of a further loss of gas in increasing quantity and suddenness. But whatever the precise circumstances may have been, the explanation that the disaster was caused by a substantial loss of gas in very bumpy weather holds the field."

In regard to the design of "R.101," no suggestion is made in the Report that there was any radical defect in the airship's construction, but "in the construction of the 'R.101' the designers broke away almost completely from conventional methods, and in every direction an attempt was made to improve upon the standard Zeppelin practice. Some of these inventions were a natural consequence of the great size of the airship, while others aimed at securing interchangeability of component parts. These novelties in design, however, were not confined to the general anatomy of the hull but extended to many important details such as gasbag-wiring, relief valves, steering mechanism, and even included the adoption of a novel design of heavy oil engine. During the construction, and in the early trial flights of the 'R.101,' a policy of cautious experiment at each step was admirably fulfilled, but in the later stages, when it became important to avoid further postponment, and the flight to India thus became urgent, there was a

[1] C.M. 3825; price 2s. 6d.

tendency to rely on limited experiment instead of tests under all conditions. The programme of trials as at first submitted to Major Scott by the Captain of the 'R.101' was far from being completed as originally intended, and the airship started for India before she could be regarded as having emerged successfully from all the exhaustive tests proper to an experimental state."

AIR ESTIMATES.—The Memorandum of the Secretary of State for Air, which accompanies this year's Air Estimates, makes the following reference to airships:—

"Fifty thousand pounds only has been provided for airships in these Estimates, which sum is taken on account to enable the Royal Airship Works to be maintained for a short period pending a decision by His Majesty's Government on the future policy of airship development. Until this decision has been taken, it is not possible to estimate the financial provision which will be required for the whole year. In the meantime a reduced staff is being maintained at Cardington, where the normal work is being supplemented by special items diverted thither as an emergency measure—e.g., the reconditioning of lorries, the manufacture of drogue targets and tests of experimental kite-balloons."

GERMANY

GRAF ZEPPELIN'S LATEST CRUISE.

The Graf Zeppelin left Friedrichshafen on 9th April for a cruise to Egypt and Palestine. She had on board twenty-five passengers, including Group-Captain E. L. Gossage, D.S.O., M.C., R.A.F., Air Attaché at the British Embassy in Berlin, and Squadron Leader R. S. Booth, A.F.C., R.A.F., commanding the "R.100." Dr. Eckener was in command of the airship.

Following a route over Marseilles, Corsica, Rome, Naples and Crete, the Graf Zeppelin arrived at Alexandria at 8.30 a.m. on 10th April. She circled over that city and then flew along the coast before proceeding to Cairo. As she was ahead of her time, the arrangements for her landing were not ready, so she flew on to Aswan, returning to Cairo and landing at the Almazar Aerodrome at 5.30 a.m. on 11th April. The ground party engaged in the landing operations were in charge of Flight Lieutenant H. F. Luck, R.A.F., officer in charge of the airship base at Ismailia. At 7.30 a.m. on the same day the airship left Cairo and cruised over Palestine. She returned to Friedrichshafen on 14th April.

UNITED STATES OF AMERICA

NEW PACIFIC LIGHTER-THAN-AIR BASE.—The House of Representatives has passed a Bill authorizing the construction of a new airship base at Sunnyvale, near San Francisco, California, at a cost not to exceed $5,000,000, which sum will be expended on a large hangar and subsidiary buildings, equipment, etc., rendered necessary by the approaching completion of the rigid airship "ZRS-4" and the anticipated commencement of construction of the sister ship, "ZRS-5." The land on which the new base will be built has been presented free to the Government, and the base is to be completed in 1932.

REVIEWS OF BOOKS

GENERAL

Scientific Disarmament. By Victor Lefebure. (Mundanus). 5s.

Apart from its bearing on disarmament this book should be read by all who study the factors affecting modern war. It explodes certain prevalent misconceptions concerning mass production of war material, conversion of commercial plant and productions to war purposes and the employment of new agents. That it is an important contribution towards clarifying the disarmament problem is attested in the foreword, contributed to it by fifteen distinguished persons.

Major Lefebure is a scientist with exceptional experience of chemical warfare and general knowledge of the technical factors which govern the production of war material. He is no advocate of total disarmament but he does believe that it is practicable to arrive at an agreement for the limitation of armaments which would greatly reduce the dangers of a recurrence of war on a " maximum " scale. His aim is to secure a time interval which would allow the political machinery for settling disputes to come into play. He argues on technical grounds that, if the production of war material is controlled, no excess on permitted armament can be established secretly or quickly; and that without such excess no nation would venture on war.

He considers that the disarmament clauses of the Treaty of Versailles indicated the correct method of approaching the problem. More recent attempts to secure limitation by agreement have neglected the question of material and have concentrated on the alternatives of budgetary control or limitation of numbers. He maintains that though these measures will find their place in the scheme they must be combined with measures designed to control the production of war material, both existing types and new agents. To frame such measures without imposing restrictions on commercial and scientific progress requires the advice of technical experts.

In support of his contentions he describes fully and with many examples the technical reasons why the control of preparatory measures entails delay in the expansion of material production. He investigates fully the possibility of the surprise production of new agents and the whole question of the conversion of commercial resources (including the conversion of commercial aircraft) to war purposes. He also deals with the prospects of discouraging research and invention tending towards the production of new agents.

All this makes very interesting reading. There can be little doubt that Major Lefebure's arguments are quite sound provided that it would be possible to secure the acceptance of his suggested measures of control; but one is left in some doubt as to how far they would entail an intolerable system of inspection and one liable to be a source of friction. He insists that private trade in arms and commercial armament firms must be prohibited. That gas warfare must not only be prohibited but that preparations for gas warfare, at present permissible as a precautionary

measure, must also go. In addition, there are many incidental points of interest touched on. For example, very strong reasons are given for refusal to believe in the "humanity" of gas warfare.

The general trend of the argument presented appears to indicate the danger of fixing too low a level of permitted armament. Major Lefebure's own experience of war makes him visualize the action of huge armies and the expenditure of vast quantities of munitions. Does he attach sufficient importance to the potentialities of small highly equipped and highly mobile armies which may be the development of the future?

The smaller such armies, the more possible would it not become to secure rapidly and secretly an excess on permitted establishment which could gain a decisive advantage in the initial stages of a war? Perhaps Major Lefebure's tentative suggestions for the standardization of permitted types of weapons would go some way towards eliminating the danger.

The Uneasy Triangle: Four Years of the Occupation. As seen by "Apex." (John Murray) 7s. 6d.

This record of the experiences of one officer of the British Army of Occupation, while doing duty first with a regiment then in the Military Intelligence Branch at Cologne, lastly in a like capacity at Wiesbaden, furnishes some most interesting reading. The circumstances attendant on the French occupation of the Ruhr, the Separatist movement, the inflation of the mark are well told and full of noteworthy criticism. It need not be thought that the British were always welcomed by the Germans, even when compared by them with the Senegalese. "Apex" tells clearly how difficult was the situation caused by our arrival at Wiesbaden with a demand for a good deal more accommodation than had satisfied the French. The Germans could not understand that such a demand was compatible with a reduction in the Armies of Occupation.

"Apex's" relations with Germans were nearly always correct; they could not always be cordial even though he had the advantage of having German relations and a perfect command of the German language. He found his position too anomalous. As he puts it: "The prejudice of each side against the other, which I did not share, lost its importance to me as an explanation of the different antagonisms and appeared childish. It all seemed out of date; the whole occupation seemed hopelessly out of date." The reasons for this state of affairs come to light very clearly when we read "Apex's" description of how the citizens of Cologne lived during the years following on the War.

On the Frontier and Beyond; A Record of Thirty Years' Service. By Lieutenant-Colonel Sir Frederick O'Connor, C.S.I., C.I.E., C.V.O. (John Murray). 15s.

The author of these reminiscences began his career in the East as a subaltern of mountain artillery, and took part in the North-West Frontier campaign of 1897–98. Subsequently he joined the Indian Foreign Department. In the course of his duties he had unrivalled opportunities for becoming acquainted with Tibet, Nepal and Persia. Indeed, it is the recital of his life and work in Southern Persia, particularly during the years he spent there during the Great War, that will chiefly appeal to military readers. But the whole book is replete with good reading, and although dealing mainly with the political aspects of the States and peoples contiguous to India, it can be strongly recommended to all who are interested in those regions, or in the shooting that is to be obtained there.

NAVAL

The Navy in India, 1763-83. By Admiral Sir H. W. Richmond. (Ernest Benn). 30s.

In this excellent book Admiral Richmond has chosen a subject peculiarly well suited to his abilities, for it enables him to write not only as an historian but also as a strategist, whose authority is enhanced by his personal knowledge of campaigning conditions in the East Indies. He has set himself the task of reviewing the events in the struggle for India, as they appeared to the Commanders that were concerned with them, and of passing judgment on their decisions. He is fully aware, however, that his own perspective has been cleared by distance, and his occasional condemnations are generally tempered with mercy; indeed, in this connection he takes into consideration many matters that might well have been overlooked by the landsman.

He is naturally most concerned with De Suffren and Sir Edward Hughes. It is no new departure, of course, to hail the former as a genius, and Admiral Richmond faithfully brings out his qualities. He insists most upon the fine mental energy that made him take advantage to the full of that most important factor in strategy—Time. De Suffren made up his mind with speed and accuracy, and carried his plans into action with the least possible delay. Thus, if he was sometimes lucky—and he was—like Nelson he had the luck he deserved. Tactically, too, he was ahead of his age and refused to subscribe to the contemporary French doctrine that to cripple the enemy aloft and hamper his mobility was a sufficient end for which to work; nor was he content with a line of battle merely conterminous with the enemy's. Local concentration and the sinking of ships were his objects, and had his Captains been of the same stuff as Nelson's, he would have come nearer attacking them. It is a pity, from the historian's point of view, that his projected plan for the battle of Cuddalore, standing, as it does, midway between Beachy Head and Trafalgar, was not carried into effect.

Hughes was not his equal, but he was a better man by far than has sometimes been supposed, and Admiral Richmond has performed a service in reinstating him. He had many difficulties to face. The Presidencies could not see the war as a whole, and made preposterous demands on him for local purposes. The Madras Council lectured him on his business without understanding its own. He suffered, on at least three occasions, from cruelly bad luck. Amidst these difficulties, and many others, he kept his head and his temper, and showed himself an able co-operator on the right occasion. His strategical judgment was sound, and once he had made up his mind what was right nothing would turn him aside. Unfortunately, in comparison with De Suffren, he made it up slowly and acted slowly; the difference was between competence and genius. Tactically, too, he was unoriginal and, like many of his contemporaries, tied to the letter of the fighting instructions. He did his duty, however, competently and conscientiously, and England might easily have been less well served in the East Indies than she was by Hughes.

The methods that Admiral Richmond has adopted lead to a close examination of a good deal of detail, and his book is not to be read lightly; he is helped by a clear and forcible style which only occasionally deviates into an ugly or obscure sentence; clarity would also have been aided by a better map. These, however, are very small points; in its essentials the book is worthy of the highest praise.

The German Submarine War, 1914-1918. By R. H. Gibson and Maurice Prendergast. (Messrs. Constable). 36s.

A number of books have now been published which deal with the activities of the German submarines during the World War, but this volume is the first attempt

to present to the public a connected story of the operations of these craft from the beginning to the end of the War. As each " U " boat leaves her base, so her movements are followed and the principal events connected with her cruise described. A list is also given each month of the names of important merchant ships sunk, with the locality of the sinking and the number of lives lost.

The German Submarine War lends itself readily to division into phases or periods—the periods of restricted and unrestricted war on shipping—the critical shipping situation of the Allies in the Spring of 1917—the gradual mastery of the submarine menace—the final victory, etc. This fact is made use of by the authors who devote a chapter to each period. For the sake of clearness events in the Mediterranean are dealt with separately in four chapters.

It is, however, from the appendices that the student of the submarine war will derive most value. In them will be found all possible information he could require for a close study of this subject, including full details of the German and Austrian submarines, their monthly distribution in the various theatres of war, cause and locality of their losses, and rate of commissioning; and a mass of data regarding convoys, allied shipping sunk, etc.

Indeed, so complete is the information in the appendices, that many will consider unnecessary the large amount of detail in the body of the book. In particular, the frequent lists of names of merchant ships sunk—which are, in any event, not intended to be complete—become very wearisome to the reader. Their very monotony defeats their object, which is clearly to emphasise the appalling losses in shipping as the submarine war on commerce grew more and more intense.

There is a tendency also for the authors to colour too highly their description of the most simple events. That " U.29," after her abortive attack on H.M.S. " Neptune," should fail to see the " Dreadnought " closing her and be rammed by her is a perfectly natural occurrence and easily explained. We are informed, however, in regard to this event, that " the " Dreadnought " turned and charged down on her venomous adversary. A brief chase ensued. Turn this way or that, " U.29 " could neither get under nor get away. As an elephant might tread down the writhing coils of a hooded cobra, so did the immense bulk of the famous battleship crush underfoot her viperine opponent." Surely this is uncalled for ? It is, in any case, mere journalistic exaggeration.

But apart from these minor faults, among which might be included an unnecessary aversion from using the same word twice (mines lose nothing of their explosive effect by being called " pineapples " and " ash-cans " !) the book is very readable and written in a form intelligible and interesting to the layman.

Two of the most interesting chapters are those dealing with the early months of the War, when the " U " boats were employed off our coasts on reconnaissance and offensive duties, and with the period between April and September, 1916, when the war on shipping was called off (as a result of American protests on the sinking of S.S. " Sussex ") when the German submarines were used in co-operation with the High Sea Fleet. The lack of success of the " U " boats against the Grand Fleet battleships—particularly on 8th August, 1914, and in the days immediately preceding and following the battle of Jutland—is very striking and shows that few German submarine officers were capable of making a successful attack against a well-screened force.

This point, which is not emphasised by the authors, is important and requires to be borne in mind when analysing the reasons for the success of the convoy system. To attack a single ship proceeding on a straight course at 10 knots re-

quires little experience. If, on the other hand, escorting destroyers are placed around the target in positions where the submarine has to show her periscope to make her last careful observations, much practice and training are required to make a successful close range attack, particularly if the target is zig-zagging irregularly. By the summer of 1917, when escorted convoys were introduced, many of the pre-war German submarine officers had perished—and even these were not well trained or fully experienced when compared with British standards. This was unquestionably one of the reasons why the losses of ships actually under convoy were so few. Appendix III of the book is of interest in this connection. It gives the merchant shipping tonnage sunk by some of the more notorious German submarine officers and bears out what was told to our submarine representative at the conclusion of the War, that out of the 400 submarine captains who had worked against us, twenty-two were responsible for approximately 60 per cent. of the total allied sinking from submarine action. The other 378 Commanding Officers only did 40 per cent. of the damage. These figures are remarkable and show how much the training and personality of the Commanding Officer concerned affect the actual fighting value of a submarine. The other advantages of the convoy system are very able and fully set out on page 257 of the book.

Although the authors, when referring to the large number of gun duels between submarines and decoy ships, point out the relatively small number of submarines sunk, they seem to have attributed generally throughout the book far more success to the gun as a weapon against submarines than is warranted by results. The same can be said about the hydrophone which is very highly praised. For example, in the table of German submarine losses in the appendix, various " U " boats, such as " U.C.39 ", " U.49," " U.99 " and " U.64," are noted as having been sunk by gun fire, when the actual cause of the sinking should be ramming or depth charges. It is the damage due to the ramming or depth charges which brings the submarine, helpless, to the surface; the subsequent gunfire merely saves the crew the trouble of scuttling their craft, as they would otherwise be compelled to do. The fact that ships had to stop to listen made hydrophones of little use and they achieved but faint success in the War.

The abortive attempts of the German submarines to penetrate the defences of Scapa Flow, the lack of adherence to their object evinced by many of their captains, the futility of submarine cruiser warfare in the open seas, the value of the High Sea Fleet for securing the safe passage of German submarines into open waters, the arguments between the German political and naval authorities for and against unrestricted war on commerce—these are only a few of the many points of interest in the book.

There is a carefully planned and very full index and the book contains many excellent photographs of German submarines, and also of Allied troopships and transports in the act of sinking.

The Mastery of the Sea. By Colonel Cyril Field. (Blackie & Son, Limited). 3s. 6d.

This book consists of a series of discursive chapters on the British Navy, old and new. It thus lacks unity, but some of the chapters are interesting and stimulating, particularly those dealing with the modern Navy, and it is Colonel Field's aim to stimulate interest rather than to write a history. It is to be hoped he may succeed in this object, but the fact that he is writing for the general reader cannot be held to excuse such errors of fact and style as this volume contains. The

measurements given of the " Great Michael " are palpably wrong ; the bald statement that Ship Money " led eventually to the Civil Wars " is misleading ; Admiral Beatty did not command the British Fleet at Jutland, as appears to be stated on page 141. It is high time to abandon such phrases as " like the modern Hun " in the interests of international courtesy ; naval officers are not invariably less foolish than politicians, and to imply that they are is to do no service to the Navy ; in the modernised version of Chaucer's portrait of the mediæval shipman that precedes Chapter IV, the poet, in one couplet, is robbed of both his metre and his rhyme. The book is well illustrated, but why include a photograph of the " Victory " *before* her restoration ?

Sea Fights. By Commandant Paul Chack. Translated from the French by Commander L. B. Denman, R.N. (Vaillant, Carinanne, Liege).

This is a painstaking translation of a little work which the author has written with the object of bringing home to his countrymen, " deafened . . . by the thunder of the cannon at the front," the effort made by the allied navies in the Great War.

It is written in a light and popular style which may commend it to the general reader, even if it contains little of importance that will be new to the naval student.

MILITARY

Bedford Forrest. By Captain Eric William Sheppard, O.B.E., M.C. (H. F. & G. Witherby). 16s.

Jeb Stuart. By Captain John W. Thomason, Jr., U.S. Marine Corps. (Charles Scribner and Sons). 15s.

Bedford Forrest and " Jeb " Stuart were the greatest cavalry commanders of the Confederacy in their respective theatres of war. In the West, John Morgan and Wheeler at one time threatened to run Forrest close. But the former's prestige never recovered from his disastrous raid across the Ohio, and the latter's reputation suffered from the rough handling, which he received from Kilpatrick in Georgia, and from the indiscipline of his troopers, which made them more hated by their own countrymen than even Sherman's " bummers."

In the East, Ashby, " Stonewall " Jackson's cavalry commander in the Valley, promised to go very far indeed, but his career was cut short before Jackson joined Lee at Richmond, and it may be doubted whether any amount of experience in the field could have compensated for his original lack of a military training. But Stuart was a West Pointer with six years' pre-war service as a cavalryman, and during the two years, in which he commanded the cavalry of the Army of Northern Virginia, his claim to pre-eminence was never questioned and he enjoyed Lee's complete confidence. His successor, Wade Hampton, was unfortunate in that the superiority of the Federal cavalry had become pronounced by the time he took over command, but he never showed any special qualification for the command of so large a body as a cavalry corps.

Some, including General Alexander and Captain Thomason, think that Lee made a grave mistake in not continuing Stuart in permanent command of the 2nd Corps after Jackson's fall at Chancellorsville. But Stuart's handling of infantry in the third day's fighting did not escape criticism, and probably Lee was well advised in retaining him in command of the cavalry, even if the choice of Ewell as Jackson's successor was scarcely happy.

It is significant that neither Captain Sheppard nor Captain Thomason has attempted to compare the merits of the two cavalry leaders. No comparison is really possible owing to the dissimilar conditions under which they were employed. The mounted arm formed an integral part of Lee's army. It served him for eyes and ears, and its use was tactical. But in the West the long lines of Federal communications stretching back to Columbus on the Mississippi and Louisville on the Ohio offered great opportunities to Confederate cavalry raids. A well-directed blow at a vital point far in the rear of the Federal armies might paralyse the whole plan of campaign and thus serve a strategic purpose. Therefore the Confederate commanders frequently detached large bodies of cavalry for raids against the enemy railways and gradually ceased to regard these detachments as forming part of their main army. Bragg in his reports speaks of his " regular " cavalry as opposed to Forrest's and Morgan's commands detached on special service. It has always been a disputed point whether this diversion of cavalry from their legitimate functions paid in the long run or not. Certainly some considerable successes were achieved. In July, 1862, Forrest's descent on Murfreesboro held up Buck's advance on Chattanooga for a fortnight, and a month later Morgan was even more successful in destroying the tunnel near Gallatin on the Louisville-Nashville railway, which it took the Federals three and a half months to repair. Captain Sheppard holds that Forrest's " first great raid " on the railway between Corinth and Columbus compelled Grant at the end of the same year to abandon his overland offensive against Vicksburg. But Van Dorn's destruction of the Federal advanced base depot at Holly Springs was by itself sufficient to account for Grant's change of plan, and the presence of Forrest's cavalry on Bragg's side in the battle of Murfreesboro might have turned the scale in the Confederate favour. Just two years later Hood made his own defeat at Nashville certain by detaching Forrest with the greater part of the cavalry to raid the railway about Murfreesboro.

But Forrest was much more than a mere raider. At Shiloh and after Nashville he showed his skill in covering the retreat of a beaten army and at Chickamauga in securing the flank of a big attack. He reached the climax of his career in 1864 when he successfully defended Mississippi against Sooy Smith's inroad, and a few months later defeated Sturgis at Brice's Cross Roads, a brilliant feat of arms. He was at his best when acting independently and not fettered by a superior's control. Apart from his final defeat at Selma, when he was overwhelmed by superior numbers under a first-class cavalry leader, his few reverses were suffered when against his better judgment he was carrying out the orders of a superior. General " Joe " Johnston pronounced him the greatest soldier that the war produced, but it does not seem probable that Forrest would have proved a success in command of an army. As in Ashby's case, his lack of a pre-war military training would have told against him, and one who was so insubordinate to his superiors would hardly have secured willing obedience from his lieutenants.

Cavalry raids formed part of Lee's programme. But Stuart's raids were very different from those of Forrest and Morgan. Their primary object was to get information and incidentally to do as much damage as possible to the enemy communications in their immediate rear. Lee, however, seems not to have distinguished sufficiently clearly between these conflicting aims. He employed an unnecessarily large force to gain information, while the damage done in the enemy's rear was speedily repaired. Stuart's reputation has been somewhat tarnished, though perhaps unjustly, by the failure of his Gettysburg raid. But in screening the movements of his own army from the observation of the enemy cavalry, he

has never been surpassed. Stuart was a cavalryman pure and simple; he believed in shock tactics and his weapon was the sabre. Forrest's men fought on foot and on horseback, but in the saddle they used pistols.

The two Confederates have been singularly fortunate in their latest biographers. Both these came well-equipped to their task and "Jeb Stuart" is a masterpiece.

In the Wake of the Tank. By Lieutenant-Colonel G. le Q. Martel, D.S.O., M.C., R.E., M.I. Mech. E., *p.s.c.* (Sifton Praed). 15s.

At the conclusion the author writes: "In this book an endeavour has been made to describe the progress we have made in the first fifteen years of mechanization;" elsewhere he states "we are still in the very early days of mechanization." Although the author has been known as a very ardent supporter of various phases of mechanization, the whole of this book is written with great tolerance, breadth of understanding, and even with some humility.

The problems that follow in the wake of mechanization are so difficult of solution that anyone who has any understanding of them is inevitably touched at times with dismay and anxiety.

There is, however, as the author points out, no possibility of avoiding these problems.

"Whether we like it or not, we must progress in this way. It is forced on us, for one thing by the progress made by some of our wilder neighbours who live on the borders of our foreign possessions. Twenty years ago they had few rifles and were mainly armed with hand weapons; to-day they have in many instances, plenty of rifles and ammunition, so that whereas we had the necessary ascendancy over them in the past by the mere possession of rifles, we can now only obtain this ascendancy by the use of all modern weapons and the assistance of the Air Force." . . . "In the past we pitted the rifle against the spear; we must now endeavour to pit armoured vehicles against the rifle."

A clear example of the difficulties with which soldiers are faced in the matter of design of weapons is given by the author in his account of the earliest tanks in 1916–1917. In order to produce tanks for use in 1917 it was essential to decide approximately the type of action for which they would be required. That is, should they again attempt to lead the assault or would they merely be required to assist the infantry in mopping up on battlefields similar to the Somme. The Tank Supply Committee put forward proposals in November, 1916, but could get no acceptance or rejection of these proposals. As a result the machines used in 1917 were far less efficient than they might have been. The lesson which the author deduces is: "Soldiers are used to making quick decisions in tactical, and even strategical problems; to this they must now add quick decisions as regards the mechanical design of their weapons."

A study of this book will undoubtedly help towards an understanding of the problems that will face us in the future.

The book contains chapters on the design and maintenance of vehicles, which are of general interest and devoid of unnecessary technicalities. The illustrations are excellent.

Five Tactical Schemes, with Solutions. By Major S. W. Kirby, O.B.E., M.C., R.E., and Captain J. R. Kennedy, M.C., R.A. (W. Clowes & Sons), 3s.

These five schemes are intended mainly for those who desire to educate themselves. They appear well conceived and up to date in their composition.

Each begins with a general idea and a special idea. These are followed by successive sections of a narrative, at the end of each section of which there is set a problem. The solution to the problem is then given in full. These solutions are applicable to officers undertaking duties of detachment or battalion commanders acting within a division. Staff College and Promotion Examination candidates can learn much from these. The schemes for them are compiled with care and full of useful detail. They are not issued by any official authority.

The Map Reading Instructor. By Captain C. A. Wilson, Army Educational Corps. (Sifton, Praed & Co., Ltd.). 5s. 6d.

This little volume contains a mass of detailed information which appears to cover very adequately the whole subject of the use and compilation of maps. The treatment is thoroughly practical. It is worth noting that frequent allusion is made to metric measures, while reference is made to the details in which French and Japanese conventional signs, etc., differ from our own. The book should be sufficient for a study of the subject as treated in any military examination. It is furnished with numerous plates and diagrams.

Handbook of Military Law. By Captain R. J. Wilkins and W. S. Chaney. William Clowes & Sons, Ltd.). 12s.

Although designed primarily to assist the candidate going up for examination in Military Law, this volume is in reality far more than a "cram-book." After going through the entire procedure of a court martial, illustrated by reproductions of the various forms, inclusive of the charge sheet, used at a trial, the authors have given some admirable pages on "Evidence." They next proceed to consider every section of the Army Act individually with full cross references and explanations as to the difficulties likely to arise when dealing with each of them. In conclusion there are several pages dealing with offences punishable by ordinary law. It is a thoroughly practical book.

Wandlung des Soldaten. By Dr. Phil. Kurt Hesse. (E. S. Mittler & Sohn, Berlin). RM. 6.50.

By the imposition of the 100,000 strong Reichsheer, raised on the basis of twelve-years' service, the Allies imposed on Germany an even greater change in its military conceptions than seemed probable at the time. The old Imperial Army, as Dr. Hesse admits, was raised and trained in a system of discipline that is no longer applicable to a small long-service army. The methods of mass production have had to yield to those of careful training of individuals. The German mind is nothing if not thorough, and the result has been, as this book shows, a complete overhaul of all previous ideas current on the training of the soldier from its foundations. The individual is now to be trained to such a degree of efficiency that he may be able to take his place in any hypothetical future expansion of the German Army, as a leader. The present army is no more than a *Führerheer*, that is, virtually a school for N.C.O's and junior officers. There is, to the British officer, really nothing very new in this idea, and when the German thinks he has established a new order of things in military thought, he is not giving us anything very new. But the book is well worth careful perusal by those who are charged with the higher direction of our barrack-square training. The manner in which the German soldier is now being "educated" and the means being adopted to create a new military "personality" in the ranks of the Reichsheer are most interesting if only in contrast with previous ideas that were held as to the training of the conscript—not only in Germany.

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MILITARY

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Report of Proceedings

AT THE

Hundredth Anniversary Meeting

TUESDAY, 3RD MARCH, 1931, AT 3.30 P.M.

ADMIRAL OF THE FLEET SIR ROGER KEYES, BART., G.C.B., K.C.V.O., C.M.G., D.S.O., LL.D., D.C.L. (*Vice-Chairman of the Council*), presiding.

THE SECRETARY, Captain E. Altham, C.B., R.N., read the Notice convening the Meeting.

ANNUAL REPORT FOR 1930

The Council have the honour to present their Annual Report for the past year.

COUNCIL

VICE-CHAIRMAN

At their meeting in October, the Council learnt with much regret that Admiral Sir William Goodenough, G.C.B., M.V.O., who had been Vice-Chairman since the previous Annual General Meeting, felt compelled to resign from the Council owing to the many calls on his time since he had been elected President of the Royal Geographical Society.

Admiral of the Fleet Sir Roger J. B. Keyes, Bart., K.C.B., K.C.V.O., C.M.G., D.S.O., LL.D., D.C.L., was elected a Naval Member and Vice-Chairman of the Council in succession to Admiral Sir William Goodenough.

ELECTED MEMBERS

The following Members of the Council, having completed three years' service, retire :—

ROYAL NAVY

Admiral Sir George P. W. Hope, K.C.B., K.C.M.G.

ROYAL NAVAL RESERVE

Captain Sir D. Wilson-Barker, Kt., R.D., R.N.R.

REGULAR ARMY

General Sir J. F. Noel Birch, G.B.E., K.C.B., K.C.M.G.
Colonel C. H. Colvin, C.B., D.S.O.
Major-General P. G. Grant, C.B., C.M.G.
Lieutenant-Colonel A. F. A. N. Thorne, C.M.G., D.S.O.

INDIAN ARMY

Field-Marshal Sir Claud W. Jacob, G.C.B., G.C.S.I., K.C.M.G.

ROYAL AIR FORCE

Air Vice-Marshal Sir Vyell Vyvyan, K.C.B., D.S.O.

All the above, with the exception of Major-General P. G. Grant, have offered themselves for re-election.

Rear-Admiral E. A. Astley-Rushton, C.B., C.M.G., resigns from the Council on taking up a sea-going command.

Rear-Admiral The Hon. R. A. R. Plunkett-Ernle-Erle-Drax, C.B., D.S.O., has been nominated to fill the Naval vacancy, and Major-General J. R. E. Charles, C.B., C.M.G., D.S.O., to fill the Regular Army vacancy.

REPRESENTATIVE MEMBERS

Rear-Admiral C. V. Usborne, C.B., C.M.G., has succeeded Rear-Admiral B. E. Domvile, C.B., C.M.G., as Admiralty Representative on the Council.

EX-OFFICIO MEMBERS

Admiral Sir Frederick L. Field, K.C.B., K.C.M.G., has succeeded Admiral of the Fleet Sir Charles E. Madden, Bart., G.C.B., G.C.V.O., K.C.M.G., LL.D., as an ex-officio Member of the Council on becoming Chief of the Naval Staff and First Sea Lord.

Major-General J. G. Dill, C.B., C.M.G., D.S.O., has succeeded Major-General C. W. Gwynn, C.B., C.M.G., D.S.O., on taking up the appointment of Commandant of the Staff College, Camberley.

Air Commodore P. B. Joubert de la Ferté, C.M.G., D.S.O., has succeeded Air Vice-Marshal E. R. Ludlow-Hewitt, C.B., C.M.G., D.S.O., M.C., on taking up the appointment of Commandant of the Royal Air Force Staff College, Andover.

MEMBERSHIP.

During the past year 207 officers joined the Institution (compared with 178 in 1929). There were 124 withdrawals (compared with 100 in 1929). Thirty-three Life Members and 63 Annual Members died; 37 Members were struck off for being in arrears with their subscriptions.

The total number of Members on the books on 31st December, 1930, was 5,741. This represents a decrease of total membership on the year of 50 Members, but as the loss included 33 Life Members deceased and 2 struck off for not completing their subscriptions, the net financial loss in membership is 15.

Details of Members joining are as follows :—

Regular Army (all arms)	133
Royal Navy	37
Royal Air Force	16
Indian Army	7
Territorial Army	6
Royal Marines	4
Royal Naval Reserve	2
Royal Naval Volunteer Reserve	1
Royal Indian Marine	1
	207

The greater proportion of the resignations received have been from retired officers, and of those the majority express regret at being compelled to leave the Institution on account of financial exigencies.

While the falling-off in total membership is a matter for some concern, it is gratifying to note that there has been an increase in the number of new Members during the year as compared with 1929, and that of this number 56 are junior officers who have taken advantage of the new Bye-Law enabling them to join without payment of entrance fee.

Every effort is now made to cater for the serving officer and to assist him in his professional studies. It is hoped, therefore, that, as this becomes more fully appreciated, the latter will join in increasing numbers.

In view of the fact that 1931 is the Centenary of the Institution, Members are asked to make a special effort to secure new recruits.

It should be noted that the Board of Admiralty, Army Council and Air Council have each expressed their wish to encourage officers to join the Institution.

Finance

The year 1930 has been a satisfactory one from a financial point of view. The receipts from all sources, excluding refund of Income Tax, show an increase of £153 10s. 10d., while expenditure shows a decrease of £329 0s. 2d., as compared with 1929. The balance carried forward is £513 11s. 3d.; the comparative figure for the previous year having been £289 6s. 7d.

During the year, £1,200 has been invested in 5 per cent. War Loan, 1929–47.

The increase in receipts has been due mainly to the improvement in the Museum takings and in the outside sales of the Journal, particulars of which are given under their respective headings.

Expenditure has been reduced, partly by a decrease in the cost of the Special Exhibitions held during the year, including a more economical system of illumination, and partly because it has been unnecessary to incur expenses in connection with repairs and upkeep to the same extent as in 1929.

While they are glad to be able to present such a favourable financial statement, the Council would again remind Members that the Institution

has no great working margin, and that it is necessary, with their responsibility for a building of such a size, to have funds available for unforeseeable contingencies. Future prosperity is mainly dependent, therefore, on continued support by the Services.

JOURNAL

The JOURNAL has had a very successful year, and the outside sales again show an appreciable improvement. The actual receipts from this source during 1930 were £844 11s. 6d., as compared with £772 14s. 7d. in 1929. This source of income for the JOURNAL has shown a steady increase year by year, and the sales are now more than double what they were seven years ago.

The high standard of lectures and articles has been maintained, and a good percentage of contributions continue to be received from serving officers.

It is desired to give every encouragement to young officers with new and original ideas to put their views before our readers, and the Editor will always gladly assist those who may be diffident about their literary ability.

The Council desire to acknowledge their indebtedness to the Naval, General and Air Staffs for their co-operation in compiling the professional Notes, and their ready assistance at all times.

The thanks of the Institution are due to the various lecturers and writers who have contributed to the JOURNAL, and to the Admiral Commanding the Naval War College for facilitating the reproduction of certain lectures originally delivered at that establishment.

LIBRARY

The number of books added to the Library during last year was 199, bringing the total number of books to 27,106, together with 7,420 maps.

The advantage of the new comprehensive rate of subscription in including the use of the Lending Library, continues to be apparent.

MUSEUM

The number of people to visit the Museum during the year was 52,524. This constitutes a record, and is 831 more than the previous highest number in 1928. The receipts were £185 in excess of 1929, and only £2 16s. 0d. below 1928, which was a record year financially. The receipts for the months June, July, August, September and October were in each case the highest on record for those months. The fact that the admissions are higher than in any previous year, although the takings fall just short of the record, is due to the greater advantage which has been taken of the facilities for free admission offered to friends of Members admitted by ticket and to scouts and guides. Of the latter, 849 were admitted as against the next highest number, 465, in 1929.

The Model Aeroplane Exhibition in the early months, and the Dioramas of famous battles which formed the Special Exhibition for the greater part of the year, have proved very attractive, and the Institution is much indebted

to the Air Ministry and the Department of Overseas Trade for their valuable assistance in lending these Models and Dioramas.

Further progress has been made in obtaining modern exhibits for the Crypt. In the naval section there have been added scale models of the 10,000-ton cruiser "London," and of a minesweeper; while the Admiralty have presented a collection of the latest naval shell. A model of a Mark II tank, constructed to the Institution's order by Messrs. Vickers-Armstrongs, has been added to the military section. Messrs. Fairey have presented scale models of two of their Service aircraft, and the Air Ministry have provided a set of typical bombs.

The Institution has, unfortunately, been called upon to surrender the collection of medals formed by the late Lord Cheylesmore, which had been on loan for nearly thirty years. In order to replace this, medals already belonging to the Institution, together with three groups presented by Lieutenant-Colonel Channer, Major Ferrar and Major Teichman, in response to appeals in the JOURNAL, have been specially arranged in sixteen cases. This collection already constitutes a very fine exhibit, and has the advantage that the greater part of it will remain the permanent possession of the Institution. Additions to it will, however, be very greatly appreciated, especially as regards naval medals, of which very few specimens are as yet included.

Her Majesty the Queen has again shown her interest in the Museum by the gracious gift of a snuff-box commemorative of the battle of Waterloo.

The Institution is indebted to generous donors for thirty-nine other exhibits added during the year.

ROYAL UNITED SERVICE INSTITUTION.

BALANCE SHEET, 31st DECEMBER, 1930.

DR. CR.

	£ s. d.	£ s. d.
To ACCUMULATED FUND—		
Excess of Assets over Liabilities, as at 31st December, 1929	87,097 10 11	
Additions to Museum Exhibits, etc., catalogued during the year, per contra £346 10 0		
Less: Withdrawals, per contra .. 31 0 0	315 10 0	
Appreciation of Investments to Market Price, 31st December, 1930	1,011 7 11	
Revenue Account—balance per attached account	513 11 3	
		88,938 0 1
„ SUBSCRIPTIONS, Etc.—Paid in Advance ..		305 7 6
„ LIFE SUBSCRIPTIONS—Proportion carried forward		292 9 0
„ CREDITORS		1,035 3 4
„ MUSEUM EXHIBITS PURCHASE FUND ..		37 13 3
„ LEASEHOLD REDEMPTION FUND ..		3,398 10 9
		£94,007 3 11

BERTRAM ABEL SMITH } Chairman,
} Finance Committee.

E. ALTHAM, Secretary.

	£ s. d.	£ s. d.
By LEASEHOLD BUILDING—Whitehall, S.W.1, at Cost (covered by Insurance for £40,000) ..		23,101 16 8
„ FURNITURE, FIXTURES, FITTINGS, BOOKS, MAPS, CHARTS, etc. (as valued for Insurance at 31st December, 1926, plus additions) ..		10,185 3 0
„ MUSEUM EXHIBITS, etc.— (excluding Loan Collection)—		
As at 31st December, 1929	42,004 15 6	
Additions catalogued during the year ..	346 10 0	
	42,351 5 6	
Deduct: Withdrawals during the year ..	31 0 0	
		42,320 5 6
(Note: The Museum Exhibits, including Loan Collection, are covered by Insurance for £59,223 0s. 6d.)		
„ INVESTMENTS at Market Price, 31st Dec., 1930—		
£2,421 18s. 8d. India 3½% Stock	1,525 16 4	
£2,157 14s. 7d. 5% War Loan, 1929/47 ..	2,222 9 2	
£6,693 19s. 0d. 4% Funding Loan, 1960/90	6,325 15 8	
£4,701 19s. 9d. 3½% Conversion Loan ..	3,843 17 6	
		13,917 18 8
„ LEASEHOLD REDEMPTION FUND— Premiums paid to 31st December, 1929, on Insurance Policies for £23,100 expiring October, 1972	3,332 7 2	
Add: Premium paid during year	66 3 7	
		3,398 10 9
„ DEBTORS AND AMOUNTS PAID IN ADVANCE		326 18 1
„ CASH AT BANKERS AND IN HAND ..		756 11 3
		£94,007 3 11

TO THE MEMBERS OF THE ROYAL UNITED SERVICE INSTITUTION.

We have audited the above Balance Sheet dated 31st December, 1930, and have obtained all the information and explanations we have required. In our opinion such Balance Sheet is properly drawn up so as to exhibit a true and correct view of the state of the Institution's affairs according to the best of our information and the explanations given to us and as shown by the books of the Institution.

Alderman's House,
Bishopsgate, London, E.C.2.
5th February, 1931.

BARTON, MAYHEW & CO., Chartered Accountants.
Auditors.

REVENUE ACCOUNT FOR THE YEAR ENDED 31ST DECEMBER, 1930.

DR. CR.

	£ s. d.	£ s. d.
To Salaries	2,217 14 8	
,, Wages and National Insurance	1,995 0 10	
,, Attendants' Clothing	70 10 6	
,, Pensions	135 4 0	
		4,418 10 0
,, Museum Repairs and Sundries and Special Exhibitions	144 11 10	
,, Transfer to Museum Exhibits Purchase Fund	100 0 0	
		244 11 10
,, Journal Printing	1,575 7 8	
,, Journal Postage	333 2 8	
,, Literary Services	307 19 10	
,, Shorthand Notes	37 3 4	
		2,253 13 6
,, Library Purchases and Binding of Books	156 9 10	
,, Periodicals and Newspapers	63 14 9	
		220 4 7
,, Advertising	21 11 6	
,, Lecture Expenses	9 9 0	
		31 0 6
,, Ground Rent	580 0 0	
,, Water Rate	63 9 4	
,, General Rates	578 17 5	
,, Insurance	97 6 1	
		1,319 12 10
,, Fuel	134 13 11	
,, Lighting	293 13 3	
,, Institute Repairs, etc.	133 9 10	
,, House Expenses and Sundries	105 7 11	
,, Restoration of Pictures	38 0 0	
		705 4 11
,, Audit Fee, 1930		52 10 0
,, Legal Expenses		3 4 0
,, Postages, Telegrams, etc.	79 8 10	
,, Printing and Stationery	189 8 5	
,, Telephone	35 14 0	
,, Travelling Expenses	6 3 2	
		310 14 5
,, Contribution to Staff Pension Scheme		155 4 8
,, Leasehold Redemption Fund		66 3 7
,, Gold Medal for R.U.S.I. Prize Essay, 1929		13 17 6
		£9,794 12 4
,, Balance carried down		482 11 0
		£10,277 3 4
,, Balance carried to Balance Sheet		513 11 3
		£513 11 3

	£ s. d.	£ s. d.
By Members' Subscriptions Received	4,879 14 4	
,, Voluntary Extra Subscriptions	13 8 6	
,, Life Subscriptions—Amount brought to credit	73 2 0	
,, Entrance Fees	285 12 0	
		5,251 16 10
,, Admissions to Museum	2,020 6 0	
,, Sale of Museum Catalogues and Pamphlets	73 5 5	
		2,093 11 5
,, Sales of Journal	844 11 6	
,, Advertisements in Journal	400 0 0	
		1,244 11 6
,, Profit on Repairing Regimental Colours	22 9 3	
,, Miscellaneous Receipts	1 4 2	
		23 13 5
,, Rent of Lecture Theatre, etc.		263 12 0
,, Dividends and Interest Received		649 18 2
,, Government Grants		750 0 0
		£10,277 3 4
By Balance brought down, being Excess of Income over Expenditure for the year		482 11 0
,, Income Tax recovered in respect of year 1929/30		31 0 3
		£513 11 3

CHESNEY MEMORIAL MEDAL FUND

DR. 31st DECEMBER, 1930. CR.

	£ s. d.	£ s. d.		£ s. d.	£ s. d.
To Balance of Fund at 31st December, 1929—			By Balance of Fund at 31st December, 1930—		
Cash at Bankers	49 0 1		Cash at Bankers	56 18 9	
Investment at Market Price	188 12 0		Investment at Market Price—		
		237 12 1	£230 Bengal and North Western Railway 3½% Preference Stock	188 12 0	
„ Dividends Received, less Tax		7 0 10			245 10 9
„ Income Tax recovered in respect of year 1929/30		0 17 10			
		£245 10 9			£245 10 9

We have audited the above Statement of the Chesney Memorial Medal Fund for the year ended 31st December, 1930, and certify the same to be correct.

Alderman's House,
Bishopsgate, London, E.C.2.
5th February, 1931.

BARTON, MAYHEW & CO., Chartered Accountants,
Auditors.

TRENCH GASCOIGNE PRIZE FUND

DR. 31st DECEMBER, 1930. CR.

	£ s. d.	£ s. d.		£ s. d.	£ s. d.
To Balance of Fund at 31st December, 1929—			By 1st Prize Essay, 1929	31 10 0	
Cash at Bankers	58 7 3		„ 2nd Prize Essay, 1929	21 0 0	
Investments at Market Prices	1,142 19 5				52 10 0
		1,201 6 8	„ Balance of Fund at 31st December, 1930—		
„ Dividends Received, less Tax	43 19 9		Cash at Bankers	66 0 6	
„ Ditto Gross	5 0 0		Investments at Market Prices—		
		48 19 9	£1,862 London and North Eastern Railway 3% Debenture Stock .. £1,061 6 10		
„ Income Tax recovered in respect of year 1929/30		11 3 6	£100 5% War Loan, 1929/47 .. 103 0 0		
„ Appreciation of Investments to Market Price, 31st December, 1930		21 7 5		1,164 6 10	
					1,230 7 4
		£1,282 17 4			£1,282 17 4

We have audited the above Statement of the Trench Gascoigne Prize Fund for the year ended 31st December, 1930, and certify the same to be correct.

Alderman's House,
Bishopsgate, London, E.C.2
5th February, 1931.

BARTON, MAYHEW & CO., Chartered Accountants,
Auditors.

BRACKENBURY MEMORIAL FUND

31st DECEMBER, 1930.

DR.	£ s. d.	£ s. d.		£	£ s. d.
To Balance of Fund at 31st December, 1929—			By Hugh Rees, Ltd.—Books and Maps		14 15 9
Cash at Bankers	22 17 6		,, G. Blunt & Sons, Ltd.—Mounting and Binding Maps, etc.		18 14 6
Investment at Market Price	422 2 1		,, Royal United Service Institution— Administration Fee		1 1 0
		444 19 7	,, Balance of Fund at 31st December, 1930—		
Dividends Received, Gross		21 1 0	Cash at Bankers	9 7 3	
Appreciation of Investment to Market Price, 31st December, 1930		11 11 7	Investment at Market Price— £421 1s. 0d. 5% War Loan, 1929/47	435 13 8	
					443 0 11
		£477 12 2			£477 12 2

We have audited the above Statement of the Brackenbury Memorial Fund for the year ended 31st December, 1930, and certify the same to be correct.

Alderman's House,
Bishopsgate, London, E.C.2.
5th February, 1931.

BARTON, MAYHEW & CO., Chartered Accountants,
Auditors.

EARDLEY-WILMOT MEDAL FUND

31st DECEMBER 1930.

DR.	£ s. d.	£ s. d.		£ s. d.	£ s. d.
To Balance of Fund at 31st December, 1929—			By Balance of Fund at 31st December, 1930—		
Cash at Bankers	1 4 3		Cash at Bankers	9	
Investment at Cost	99 5 0		Investment at Market Price— £100 5% Conversion Loan, 1944/64	106 0 0	
		100 9 3			111 0 9
,, Dividends Received, Gross		3 16 6			
,, Appreciation of Investment to Market Price, 31st December, 1930		6 15 0			
		£111 0			£111 0 9

We have audited the above Statement of the Eardley-Wilmot Medal Fund for the year ended 31st December, 1930, and certify the same to be correct.

Alderman's House,
Bishopsgate, London, E.C.2.
5th February, 1931.

BARTON, MAYHEW & CO., Chartered Accountants,
Auditors.

CENTENARY FUND

31st DECEMBER, 1930.

DR	£ s. d.		£ s. d.
To Subscriptions Received	28 9 6	By Balance of Fund at 31st December, 1930— Cash at Bankers	28 9 6

We have audited the above Statement of the Centenary Fund for the year ended 31st December, 1930, and certify the same to be correct.

Alderman's House,
Bishopsgate, London, E.C.2.
5th February, 1931.

BARTON, MAYHEW & CO., Chartered Accountants,
Auditors

THE CHAIRMAN'S ADDRESS.

Gentlemen, it will interest you to know that on this same day, the 3rd March, in 1832, the First Annual Report of the Council was presented to the members of what was then called the "Naval and Military Library and Museum." The Chairman on that occasion was a late Commander-in-Chief at Portsmouth, Admiral the Honourable Sir Robert Stopford.

After the meeting seventy members sat down to what is recorded as having been "an excellent dinner" at the Thatched House Tavern in St. James's Street. At the dinner the Right Hon. Sir John Hobhouse, Secretary-at-War, was in the chair, and supporting him were Admiral Stopford and Lieutenant-General Sir John Byng, that distinguished soldier who had commanded the Second Brigade of the Guards Division at Waterloo.

In returning thanks for his health having been drunk, the Secretary-at-War warmly commended the foundation and objects of the Institution. He remarked that no Institutions could stand higher in his esteem than those which added lustre to the British arms, for wherever those arms were seen, there also were planted the standards of freedom and civilization; there were sure to be found those blessings which it was our happiness to enjoy at home and our pride to diffuse abroad. In concluding his speech he said: "To those amongst you who have been instrumental in the formation of this Institution I will say that a just posterity will tender them its gratitude for the results of their present labours, and in the meanwhile their own approving consciences will amply repay them for the toil and anxiety of so noble an enterprise. Go on, therefore, and flourish; and after having stood foremost in the ranks of conquest, prove to the world by your bright example that the best result of the triumphs of war is the power and the will to propagate the arts of peace."

The record of this gathering concludes with the remark that "the greatest conviviality and cordiality prevailed till a late hour."

In June of this year the Royal United Service Institution will celebrate the centenary of its foundation. That event took place in the summer of the year preceding the First Anniversary Meeting. Although the name has been changed from time to time, the general aims, work and Service associations of the Institution have been continuous since its foundation, and now, one hundred years later, we may well tender to the founders that gratitude for their labours which Sir John Hobhouse so correctly prophesied they would earn from posterity.

The mission of the Institution, as laid down in the Royal Charter of 1860, is "the promotion and advancement of naval and military science and literature." The primary object of that mission is to assist officers in their professional studies and thereby enhance the efficiency of the fighting Services. To-day those Services are pared to the bone; yet, ultimately, it is on their efficiency that the "safety, honour and welfare" of Britain and the British Empire still depend. The Institution, therefore, far from being an association of militarists imbued with the war spirit, is one of officers, most of whom know only too well what war is, and who are devoting their lives to be so proficient in its arts that we shall have a true defence against the danger of it recurring and the calamity of defeat.

But the officer of to-day requires a wider outlook than that which makes him an expert in his own particular arm. To quote again from that speech of Sir John Hobhouse, "You, gentlemen, are more than travellers; you go

forth into remote . . . regions, and in the ordinary routine of your duties may be entrusted with vast and discretionary powers—not infrequently with diplomatic authority. The power of increasing the happiness of those with whom you are thus brought into connection must, of course, be augmented in proportion as you yourselves become more profoundly skilled in science, and practised in those arts which denote and ensure the progress of civilisation."

From time to time officers are still called upon to represent their country and to uphold her interests in many and diverse situations; while to-day the Services are more closely associated than ever with national policy. For some years, therefore, the Council have made a point of encouraging those broader studies which, without assistance, officers may find difficulty in pursuing. Men of eminence in international affairs and scientific development have done us the honour of lecturing here. The JOURNAL, in which these lectures are published, bears further witness to this policy in the scope of its articles, and in the considerable section now devoted to the "International Situation." To-day members are being asked to pass a new Bye-Law which will admit to our numbers civilians who are distinguished for their work in connection with Naval and Military science or literature.

All this means that the Institution is not one purely for the study of the arts of war, but that it embraces those many and varied subjects which now form an essential part of the higher education of the serving officer. It caters, too, for those wider interests which its members, whether serving or retired, must take, and do take, in the affairs of the nation and of the Empire.

At that first General Meeting, to which allusion has been made, when the Institution was but a few months old, a resolution was passed thanking the Council for having brought it to a prosperous state. Now, at this Hundredth Anniversary, the Council are glad to be able to present a Report which shows that the state of the Institution may still be described as prosperous, and in this connection I feel sure I am voicing the opinion of the Members when I say we owe not a little to our very enterprising and energetic Secretary.

REPORT AND ACCOUNTS.

The Report and Accounts have been circulated. I will take the Report down to but excluding Finance. Are there any questions anyone wishes to raise?

A MEMBER: There is one question I should like to raise. I do not think the very valuable Report which I have in my hand has been circulated amongst the Members. I can quite appreciate that with the big membership we have here it is probably impracticable, but I would submit for the consideration of the Council that when the JOURNAL is sent out—I believe we received it about a fortnight ago—a copy of the Report should be sent with it and thus reach the Members of the Institution, who undoubtedly take an interest in it by receiving the JOURNAL and having it sent to them. If the Report has not at that time been adopted by the Council it might be termed the Draft Report. That would give all the Members an opportunity of knowing precisely what this Report contains and what the financial condition of the Institution is.

THE CHAIRMAN: The Report cannot be circulated in the February JOURNAL because the auditors have not then finished the audit, but it is circulated in the May JOURNAL, and I take it that copies are here and available.

THE SECRETARY: Copies are available a fortnight before this meeting.

THE MEMBER: Could not a notice be put into the JOURNAL to that effect? Before coming to this meeting I was searching to find what we had to consider. It may be due to my ignorance of the Bye-Laws and details of the Institution, but I submit for your consideration that those of us who do not, perhaps, follow matters as closely as we should might have a little more information on the subject.

THE CHAIRMAN: The announcement of the meeting is in the February JOURNAL, and copies of the Report have been in the Reading Room for the last fortnight for anyone who wished to see them.

Are there any other comments on the Report down to Finance?

If not, we will take the section dealing with Finance. Are there any questions on that?

Are there any questions on the Journal Report, the Library Report or the Report on the Museum?

No questions were asked.

THE CHAIRMAN then moved:—

"That the Report and Accounts, as circulated, be taken as read and adopted."

THE CHAIRMAN OF THE FINANCE COMMITTEE: I have much pleasure in seconding the motion. I understand there are no questions with regard to Finance. The Report gives a very detailed account of the Finance, but had there been any questions I should have endeavoured to answer them. I think we may be satisfied that, as we have increased receipts and reduced expenditure, we have had a very satisfactory year, and following on what the Chairman has said I should like to say that the decreased expenditure is very largely due to the work of the Secretary, because there is a reduction of expenditure under nearly every head.

You may like to know that during the past three years the receipts have gradually increased each year. In 1928 we received £9,826; in 1929, £10,044, and this year, £10,277. I think it is possible we may not do quite so well this year, but I think Members may be satisfied that the finances of the Institution are in a very good state, and if we do not do quite so well this year it will not seriously inconvenience us.

The resolution was adopted unanimously.

NEW BYE-LAW GOVERNING MEMBERSHIP OF EMINENT CIVILIANS.

COLONEL J. JOSSELYN, C.M.G., D.S.O., O.B.E., T.D.: I beg to propose:—

"That the new Bye-Law governing the admission of Civilian Members, as posted in the Reading Room, be adopted."

This Resolution relates to the change in the Bye-Laws to which the Chairman has already made reference. The position shortly is this, that as the Bye-Laws stand now there are certain civilians who are eligible for admission by election, but those are civilians who are holding or who have held some office in connection with the Services. There is also a provision in the Bye-Laws for the election by the Council of certain Honorary Life Members, such as distinguished foreigners and eminent individuals generally.

The new proposal is that provision should be made for admitting to full paying membership a limited number of eminent civilians, such as scientists, distinguished inventors, authors and so forth whose work bears on Service

matters and is of assistance to the Services, or those who have perhaps been, in their civilian capacity, of assistance during the War or in some other way. It is essential, of course, that there should be a limit, so that the Service character of the Institution shall be safeguarded, and that is provided in the Bye-Law; the number of these eminent gentlemen who may be elected will be fixed by the Council.

The actual Bye-Law will take the form of a new paragraph, paragraph 2 (*a*), to Chapter II, page 13, and reads as follows:—

> "A limited number of eminent individuals, not otherwise eligible, who have contributed towards the promotion and advancement of naval and military science and literature, may be elected members by ballot of the Council. The limit of the number of such Members shall be fixed from time to time by the Council."

Then there is a consequential amendment to a later clause, paragraph 3:—

> "Candidates for ballot and for admission must be duly proposed and seconded by Members personally acquainted with them, other than Members elected under paragraph 2 (*a*) above, and their names shall be placed in the Library 14 days before submission to the Council for ballot.
>
> In all cases of ballot, one black ball in ten shall exclude."

With that explanation I beg to move the motion.

ADMIRAL SIR H. H. BRUCE, K.C.B., M.V.O.: I have much pleasure in seconding the motion.

COLONEL C. N. SIMPSON, D.S.O.: Is the Air Force to be included? The Bye-Law as proposed says nothing about the Air Force; it says "A limited number of eminent individuals not otherwise eligible who have contributed towards the promotion and advancement of Naval and Military science."

COLONEL JOSSELYN: That is included in "military science."

THE CHAIRMAN: That point was considered by the Council; the wording is the wording of the old Charter, and it was decided that in future the term "Military" should be regarded as including Air Service interests.

The resolution was adopted unanimously.

RE-ELECTION OF AUDITORS.

COLONEL H. C. WYLLY, C.B.: I beg to propose:—

> "That Messrs. Barton, Mayhew & Co. be re-elected Auditors for the ensuing year at a fee of fifty guineas."

CAPTAIN M. BROCK BIRKETT, D.S.O., R.N.: I beg to second that.

The resolution was adopted unanimously.

VACANCIES ON THE COUNCIL.

THE SECRETARY: I have to report that the undermentioned officers have been nominated as candidates for the vacancies on the Council:—

ROYAL NAVY (*2 vacancies*).

Admiral Sir Geroge P. W. Hope, K.C.B., K.C.M.G., for re-election.

Rear-Admiral The Hon. R. A. R. Plunket-Ernle-Erle-Drax, C.B., D.S.O., for election.

ROYAL NAVAL RESERVE (*1 vacancy*).

Captain Sir D. Wilson-Barker, Kt., R.D., R.N.R., for re-election.

REGULAR ARMY (4 *vacancies*).

General Sir J. F. Noel Birch, G.B.E., K.C.B., K.C.M.G., for re-election.
Major-General J. R. E. Charles, C.B., C.M.G., D.S.O., for election.
Colonel C. H. Colvin, C.B., D.S.O., for re-election.
Lieut.-Colonel A. F. A. N. Thorne, C.M.G., D.S.O., for re-election.

INDIAN ARMY (1 *vacancy*).

Field-Marshal Sir Claud W. Jacob, G.C.B., G.C.S.I., K.C.M.G., for re-election.

ROYAL AIR FORCE (1 *vacancy*).

Air Vice-Marshal Sir Vyell Vyvyan, K.C.B., D.S.O., for re-election.

All these officers have signified their readiness to serve on the Council if elected at this Meeting.

THE CHAIRMAN: Is it your wish that these officers should be elected to fill the vacancies on the Council?

This was agreed to unanimously.

GOLD MEDAL AWARD, 1930.

THE SECRETARY: At their last meeting the Council received the report of the Referees on the Gold Medal competition for the year 1930. The subject of that essay, which was a military one, was "With the increase of mechanization, the mobility of land forces over large areas will become increasingly dependent upon adequate supply systems. Discuss the advantages to be gained by increased speed and range of manœuvre of mechanized forces in view of the limitations imposed by the necessity of organizing elaborate supply systems, particularly with regard to their operation in semi-civilized countries."

The envelopes containing the sealed names of the competitors were duly opened at that meeting, and the Council have approved the award of the Gold Medal and first Trench-Gascoigne Prize to Captain D. W. Boileau, R.A.S.C.

The second Trench-Gascoigne Prize has been won by Captain G. C. Shaw, R.A.O.C.

THE CHAIRMAN then presented the Gold Medal and first Trench-Gascoigne Prize to Captain Boileau and the second Trench-Gascoigne Prize to Captain Shaw amid much applause.

VOTE OF THANKS TO REFEREES.

LIEUT.-GENERAL A. G. LITTLE, C.M.G., R.M.: I have much pleasure in proposing:—

> "That the thanks of this Institution be accorded to Rear-Admiral W. A. Egerton, C.M.G., Lieut.-Colonel W. A. Lindsell, O.B.E., D.S.O., M.C., and Wing-Commander B. E. Sutton, O.B.E., D.S.O., M.C., for adjudicating on the Prize Essays."

BRIGADIER-GENERAL A. E. J. CAVENDISH, C.M.G.: I have much pleasure in seconding the motion.

The resolution was carried unanimously.

THE CHAIRMAN: That concludes the Meeting.

The usual vote of thanks was accorded to the Chairman, and the proceedings then terminated.

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THE SOCIETY FOR NAUTICAL RESEARCH

(FOUNDED IN 1910).

Patron:

H.R.H. PRINCE GEORGE, K.G., G.C.V.O

President:

Admiral of the Fleet EARL BEATTY, P.C., G.C.B., O.M., G.C.V.O., D.S.O., D.C.L.(Oxon.), LL.D.

THE OBJECTS OF THE SOCIETY:

(1) To encourage the study of nautical and naval antiquities; including the dress and equipment of seamen in all ages and races, and the build of ships, both men-of-war and merchantmen.

(2) To compile a reliable Sea Dictionary or Sailor's Word-Book, and, with that end in view, to collect information which will explain obscure words and phrases, together with the customs, usages and folk-lore that gave rise to them.

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